TAXONOMIC STUDIES OF CAPRELLIDS (CRUSTACEA, AMPHIPODA, CAPRELLIDAE) FOUND IN THE JAPANESE AND ADJACENT WATERS

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CITATION:

Arimoto, Ishitaro. TAXONOMIC STUDIES OF CAPRELLIDS (CRUSTACEA, AMPHIPODA, CAPRELLIDAE) FOUND IN THE JAPANESE AND ADJACENT WATERS. SPECIAL PUBLICATIONS FROM THE SETO MARINE BIOLOGICAL LABORATORY 1976, 3: iii-229

ISSUE DATE:

1976-12

URL:

http://hdl.handle.net/2433/176456

SPECIAL PUBLICATIONS FROM THE SETO
MARINE BIOLOGICAL LABORATORY
SERIES III

TAXONOMIC STUDIES OF CAPRELLIDS (CRUSTACEA, AMPHIPODA, CAPRELLIDAE) FOUND IN THE JAPANESE AND ADJACENT WATERS

BY

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DECEMBER 1976

Issued on December 31, 1976

Printed in Japan by
the Nippon Printing & Publishing Co., Ltd.
Osaka, Japan

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The five species, nos. 4, 43 and 68–70 marked with an asterisk, have generally been treated as uncertain species.

PART ONE

I. PREFACE

The studies on caprellids in the Japanese and adjacent waters are based on major contributions of Mayer (1890 and 1903) and Utinomi (1943–1969). Mayer (1903) recorded, on a world-wide collection, 30 species and 4 varieties in 8 genera from Japan and Korea, while Utinomi (1947) listed 49 species and 7 varieties in 11 genera from the same region on his own collection, as well as on the information from other researchers. However, the Japanese caprellid fauna is revealed to be still larger to hold 65 species and 3 varieties in 16 genera, as described in the present paper, when the materials at present in the possession of the writer which were collected in the Japanese and neighbouring waters during the years up to 1973 are taken into account, together with the great many of materials previously collected.

The caprellids undergo metamorphosis by repeated moultings in growth and exhibit a remarkable sexual dimorphism. Therefore, even the same species may often show different diagnostic characteristics according to sex and age. Tracing of metamorphoses has been done as far as possible, but still many are left for further studies.

The horizontal distribution of caprellids in the Japanese waters has not yet been clarified satisfactorily and their vertical ranges have been referred to only rarely. Ecological features of these animals in general are not known either. Records are made in the present paper on all these points as far as possible in a hope that they might be useful in further studies.

II. ACKNOWLEDGEMENTS

As his studies on caprellids have been carried out at Tokyo University of Fisheries for many years, the writer cannot find any words to express his gratitude for the privilege of having facilities for study at this university. Personally, the writer is deeply indebted to Dr. Huzio Utinomi, Professor Emeritus of Kyoto University, for his continuous encouragement, critical reading of the manuscript, and kind advices in consulting literature during the investigation.

The writer also wishes to express his thanks to the members of Tokyo University of Fisheries, who have been concerned in gathering caprellids from various seas for the present study during the cruises of the training ships of the university, the Soyo-maru, Umitaka-maru and Shinyo-maru; especially to Dr. Reizo Ishiyama, former curator of the University Museum, for his generosity to spare a laboratory space to the writer.

In collecting the material, the writer owes much to the following marine biological laboratories and fisheries experimental stations:

Sado Marine Biological Laboratory of Niigata University
Asamushi Marine Biological Laboratory of Tohoku University
Fukushima Prefectural Fisheries Experimental Station
Fukui Prefectural Fisheries Experimental Station
Kagawa Prefectural Fisheries Experimental Station
Saga Prefectural Fisheries Experimental Station.

Especially, monthly collections of caprellids through the year were made for the writer respectively by the following biologists in the vicinity of respective laboratories or stations they belonged to:

Mr. Takehiko Kitami, Sado Marine Biological Laboratory
Mr. Takayuki Saegusa, Kagawa Prefectural Fisheries Experimental Station
Mr. Tohru Yasuda, Fukui Prefectural Fisheries Experimental Station
Mr. Nobuhiko Maeseko, Nagasaki Prefectural Fisheries Experimental Station.

Further, lots of specimens from various localities have been offered to the writer for examination by the following persons:

Dr. Yaichiro Okada, the late
Dr. Asajiro Oka, the late
Dr. Zen Nagao, Hokkaido Kyoiku University
Dr. Hiroshi Ohshima, the late
Prof. Taiji Kikuchi, Amakusa Marine Biological Laboratory of Kyushu University
Dr. Toshiro Saisho, Kagoshima University
Dr. Yoshiharu Honma, Niigata University
Dr. Kiyomatsu Matsubara, the late

Dr. F. Rafi
Dr. D. R. Laubitz } National Museum of Canada
Dr. D.E. Hurley, New Zealand Oceanographic Institute
Mr. Eiji Uchida
Mr. Ken'ichi Ebina
Mr. Tadashi Fujita
Dr. J. A. Bruce, Maryland, U.S.A.
Mr. Terunori Kobayashi, Otaru Fisheries High School, Hokkaido
Mr. Takao Ino, Hirota Fisheries High School, Morioka
Mr. Yoichi Yuzawa, Yotsukura Fisheries High School, Fukushima
Mr. Rokuro Mizusawa, Noh Fisheries High School, Niigata
Mr. Shigeru Kojo, Mie Fisheries High School, Mie
Mr. Nobuo Matsunaga, Shimane Fisheries High School, Shimane
Mr. Shiro Komamura, the late
Mr. Saisaburo Komatsu, Abashiri Fisheries Experimental Station
Mr. Ryogo Yuhki, Hakodate Fisheries Experimental Station
Mr. Kunio Takahashi, Aomori Prefectural Fisheries Experimental Station
Mr. Takahiro Kikuchi
Mr. Nobunori Nakamoto } Kesen Branch of Iwate Prefectural Fisheries Experimental Station
Mr. Kentaro Akama, Toga Branch of Akita Prefectural Fisheries Experimental Station
Mr. Hiroshi Sando, Yamagata Prefectural Fisheries Experimental Station
Mr. Satoshi Tenjin, Fukushima Prefectural Fisheries Experimental Station
Mr. Kunizo Tanaka, Chiba Prefectural Fisheries Experimental Station
Mr. Ryuzo Kurata, Ohshima Branch of Tokyo Fisheries Experimental Station
Mr. Naoyuki Natsuyagi, Kanazawa Branch of Kanagawa Prefectural Fisheries Experimental Station
Mr. Toshihiko Tone, Sado Branch of Niigata Prefectural Fisheries Experimental Station
Mr. Shizuo Shoyama, Murayama Branch of Niigata Prefectural Fisheries Experimental Station
Mr. Tadashi Hamaya, Toyama Prefectural Fisheries Experimental Station
Mr. Shigeru Machinaka, Ishikawa Prefectural Fisheries Experimental Station
Mr. Tohshi Kon, Fukui Prefectural Fisheries Experimental Station
Mr. Hagita, Owase Branch of Mie Prefectural Fisheries Experimental Station
Mr. Shinji Shigemune
Mr. Tadayasu Nishimura } Yamaguchi Prefectural Open-Sea Fisheries Experimental Station
Mr. Tomoyuki Fujimoto, Kagawa Prefectural Fisheries Experimental Station
Mr. Ryozo Sano
Mr. Katsuo Hamada } Ehime Prefectural Fisheries Experimental Station
Mr. Tomoji Akizuki, Naruto Branch of Tokushima Prefectural Fisheries Experimental Station

Mr. Yasuhiko Hata, Tokushima Prefectural Fisheries Experimental Station
Mr. Tamotsu Matsunaga, Ariake Branch of Fukuoka Prefectural Fisheries Experimental Station
Mr. Atsushi Ichihara, Saga Prefectural Fisheries Experimental Station
Mr. Yoshiaki Torijima, Oh'ita Prefectural Fisheries Experimental Station
Mr. Shionami, Ohshima Branch of Kagoshima Prefectural Fisheries Experimental Station
Messrs. Yuzo Tominaga, Kimio Ito, Yoshihiko Hasegawa, Harutaka Ishioka and Haruji Nakamura, Aomori Prefecture
Mr. Isao Shibata, Kanagawa Prefecture
Messrs. Takeji Yamagishi, Katsuo Sano and Okimoto Morita, Niigata Prefecture
Mr. Tohsuke Shimazaki, Toyama Prefecture
Mr. Shinobu Ohnuki, Fukui Prefecture
Mr. Yokoyama, Hiroshima Prefecture
Mr. Tadafumi Hamai, Fukuyama Agriculture and Forestry Office
Mr. Nobuhiko Maeseko, Tsushima Island, Nagasaki Prefecture
Mr. Kimio Ito, Aomori Fishing Port Office
Mr. Yutaka Hayakawa, Aomori Agriculture Center
Mr. Yukichi Niinuma, Iwate Prefectural Fisheries Administration Office
Mr. Ichizo Kuto, Kuji Fisheries Administration Office, Iwate Prefecture
Mr. Gen'ichi Nagamatsu, Kesennuma Fisheries Administration Office, Miyagi Prefecture
Messrs. Hideo Ohhara and Hitoharu Yazawa, Shiogama Fisheries Administration Office, Miyagi Prefecture
Mr. Yutaka Yamamura, Pearl Research Institute, Mie Prefecture
Mr. Keisuke Okada, Tohkai Regional Fisheries Research Laboratory
Mr. Hirotaka Toshimi, Miyazaki Prefectural Deep-Sea Fisheries Guidance Office
Mr. Toyozo Kuto, Aomori Scallop Farm
Mr. Saburo Suzuki, Hayashida Fishermen's Cooperative Association, Fukushima Prefecture
Mr. Kumeji Suzuki, Aise Set-Net Fishing Ground, Ibraragi Prefecture
Mr. Hiroji Ishikawa, Marusho-maru Fishing Ground, Ibaragi Prefecture
Mr. Shuichiro Isokawa, Kawana Fishermen's Cooperative Association, Shizuoka Prefecture
Messrs. Tamotsu Monma and Tomoyoshi Nakazai, Ajiro Fishing Company, Shizuoka Prefecture
Mr. Tadashi Koba, Ohtsuki Pearl Company
Mr. Gohei Todaka, Oh'ita-Nagoya Fishermen's Cooperative Association
Dr. Ken'ichi Hayashi, Sabiura Marine Park Research Laboratory, Wakayama Prefecture (now at the Shimonoseki College of Fisheries, Yamaguchi Prefecture)

Mr. Masujiro Tsunoya, Toyama Prefecture.

Some specimens have been presented to the writer for examination from the following organizations:

Akkeshi Fisheries High School, Hokkaido
Yaizu Fisheries High School, Shizuoka
Wakkanai Branch of Hokkaido Fisheries Experimental Station
Kesen Branch of Iwate Prefectural Fisheries Experimental Station
Muramatsu Branch of Niigata Prefectural Fisheries Experimental Station
Ito Branch of Shizuoka Prefectural Fisheries Experimental Station
Owari Branch of Aichi Prefectural Fisheries Experimental Station
Tottori Prefectural Fisheries Experimental Station
Okayama Prefectural Fisheries Experimental Station
Hiroshima Prefectural Fisheries Experimental Station
Yamaguchi Prefectural Inland-Sea Fisheries Experimental Station
Fukuoka Prefectural Fisheries Experimental Station
Saga Prefectural Fish Culture Laboratory
Oh'ura Branch of Saga Prefectural Fish Culture Laboratory
Kumamoto Prefectural Fisheries Experimental Station
Hiroshima Agriculture and Forestry Office
Onomichi Agriculture and Forestry Office
Kumamoto Prefectural Green Laver Research Laboratory
Yatsu Fishing Ground of Fuji Fishing Company, Shizuoka Prefecture
Hokkawa Fishermen's Cooperative Association, Shizuoka Prefecture
Arai Fishermen's Cooperative Association, Shizuoka Prefecture.

In reality, the publication of this monograph would have never been achieved, if the manuscript were not checked by an advisory committee organized by Drs. Eiji Harada, Saburo Nishimura, Moto-o Tasumi, Takasi Tokioka and Huzio Utinomi, all of the Kyoto University. The author wishes to record this, particularly as regards the critical reading of the first part by Dr. T. Tokioka and the close check of the last taxonomic descriptions as well as the general editorial works by Dr. S. Nishimura, with his deepest thanks.

III. MATERIAS AND METHODS

The specimens treated in the present studies were collected in the waters along both the Pacific and Japan Sea coasts of Japanese Islands extending from Sakhalin in the north to Amami-Ohshima of Kagoshima Prefecture in the south and from the shallows down to 348 meters deep, and included also those from such special environments as the Lake Kamo in Sado Island and the inshore waters off Takamatsu in Shikoku Island, both noted for a heavy pollution due to nearly isolated topography and industrial drainage respectively. The collection was made mainly by picking up animals carefully from sea-weeds, set-nets, or ropes or rafts set in the water for fish or shellfish culture. Some collections were made by hauling a plankton net or by dredge. To make the outline of respective species as clear as possible, special care was paid to obtain even the larval forms protected under bottom objects or living on the sea floor. Specimens were fixed with formalin, then preserved in 70 % alcohol, and all deposited in the Museum of the Tokyo University of Fisheries.

The synonymy in those species which could not be examined actually by the writer was quoted from McCain (1970).

IV. GENERAL NOTES IN THE TAXONOMY OF CAPRELLIDS

A. Review of Studies on Caprellids in the Japanese Waters from 1888 to 1973

McCain (1970) classified the whole described caprellids of the world into 235 species of 61 genera. Soon later, 2 new genera and 3 new species were added from

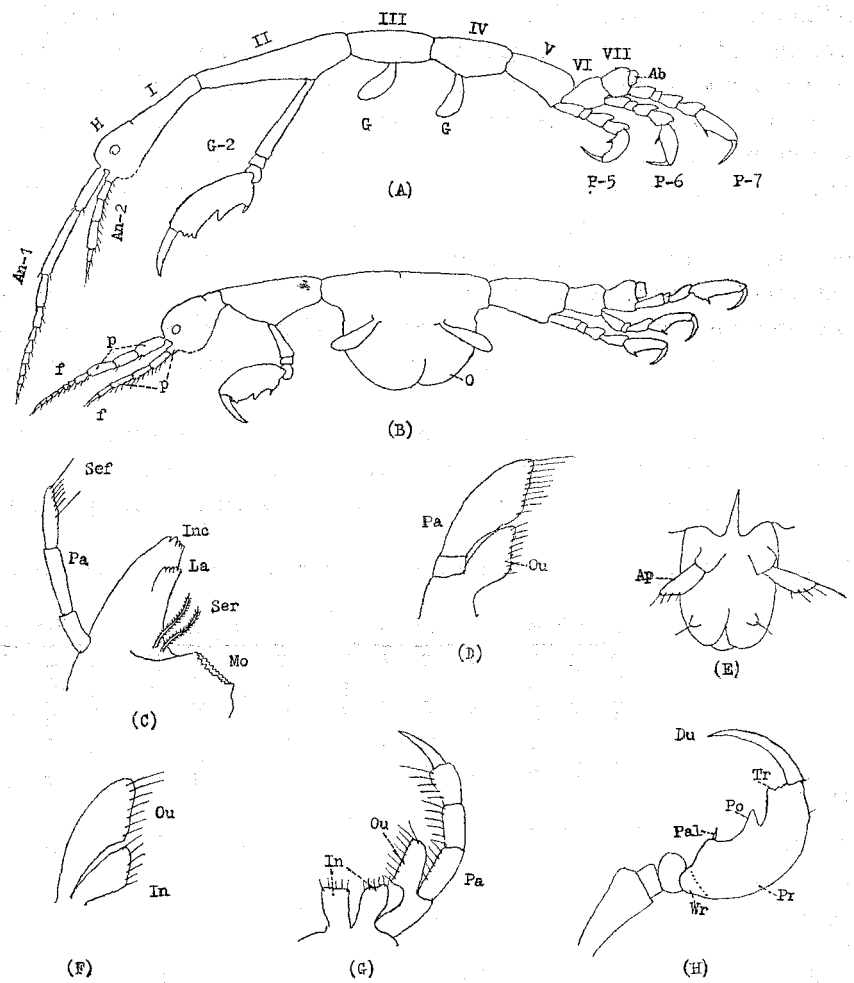

Fig. 1. Schematic representation of structures of caprellids.
(A), male; (B), female; (C), mandible; (D), maxilla 1; (E), abdomen of male; (F), maxilla 2; (G), maxilliped; (H), gnathopod 2.

H, head; I-VII, 1st to 7th pereonites; An-1, antenna 1; An-2, antenna 2; G-2, gnathopod 2; G, gill; P-5 to P-7, pereopods 5 to 7.

Ap, abdominal appendage; Du, dactylus; f, flagellum; In, inner lobe; Inc, incisor; La, lacinia mobilis; Mo, molar tubercle; O, oostegite; Ou, outer lobe; P, peduncle; Pa, palp; Pal, palmar spine; Po, poison tooth; Pr, propodus; Sef, setae for setal formula; Ser, setal row; Tr, triangular projection; Wr, wrist.

the Arabian Sea by Arimoto (1970), and thus, 238 species and 63 genera of caprellids have been known up to 1971.

The first record of caprellids in the Japanese waters was made by De Haan (1849) with the description of *Caprella kroyeri* collected by Siebold, and this species was described again from Hakodate by Lockington (1875). Then, Stebbing (1888) described *Caprella scaura* (=*C. scaura diceros*) collected off Kobe in the Challenger Report. Mayer in 1890 reported 13 species of 2 genera from 10 localities around the Japanese Islands and further in 1903, 30 species and 4 varieties of 8 genera from 11 localities around Japan. Thus, the caprellids in the Japanese waters increased to 34 species and 4 varieties of 9 genera from 17 localities, including 5 new genera, 15 new species and 3 new varieties. These reports of Mayer have been appreciated highly as the foundation of the study of caprellids in the Japanese waters.

Subsequently, Arimoto from 1929 to 1931 reported 13 species and 2 varieties of 5 genera, including a new species *Caprella okadai*, from Tateyama Bay and in 1934, 5 species of *Caprella*, including 4 new species, *Caprella carinata*, *C. cilluroantennata*, *C. longidentata* and *C. soyo*, collected by a training ship, the Umitaka-maru, of the then Fisheries Training Institute (the present Tokyo University of Fisheries) from 7 localities off the east coast of the Tohoku District of Honshu Island. Thus, Japanese caprellids increased to 41 species and 5 varieties of 11 genera collected from 24 localities.

Utinomi (1937–1947) recorded 30 species and 6 varieties from 30 localities, inclusive of 25 new localities, around the Japanese Islands. Further, in 1947 he classified caprellids so far known from the Japanese waters into 49 species and 7

Table 1. Contributions to the Japanese caprellid fauna, made by respective researchers, from 1888 to 1973.

Author and years of publication	Localities			Genera				Species				Varieties			
	Number sampled	Number newly added	Cumulative number	Number reported	Number newly added	Number denied	Cumulative number	Number reported	Number newly added	Number denied	Cumulative number	Number reported	Number newly added	Number denied	Cumulative number
De Haan (1849)	1	1	1	1	1	0	1	1	1	0	1	0	0	0	0
Lockington (1875)	1	1	2	1	0	0	1	1	0	0	1	0	0	0	0
Stebbing (1888)	1	1	3	1	0	0	1	1	1	0	2	0	0	0	0
Mayer (1890, 1903)	17	14	17	9	8	0	9	38	32	0	34	4	4	0	4
Arimoto (1927–1934)	8	7	24	6	2	0	11	18	7	0	41	5	1	0	5
Utinomi (1937–1947)	30	25	49	11	1	0	12	49	14	0	55	7	1	1	6
Vassilenko (1967)	1	1	50	1	0	0	12	12	3	0	58	1	0	2	4
Utinomi (1964–1969)	11	10	60	7	2	0	14	21	3	0	61	2	0	1	3
Arimoto (1970, 1971)	118	105	165	5	1	0	15	68	3	0	64	3	0	0	3
Utinomi (1973)	43	32	197	3	1	0	16	23	1	0	65	3	0	0	3
Arimoto (1973)	52	20	217	16	0	0	16	65	0	0	65	3	0	0	3

varieties of 11 genera. These included 4 new species found in 1943 and 3 found in 1947. Thus, Japanese caprellids increased to 55 species and 6 varieties of 12 genera collected from 49 localities. This was the first work in which the Japanese caprellid fauna was treated generally.

Vassilenko (1967) reported 12 species and a variety of *Caprella* from Possjet Bay, Primorskaya. This paper included the description of a new species and raising of 2 varieties up to the rank of species, and thus added 3 more species to the caprellid fauna which consisted then of 58 species and 4 varieties of 12 genera from 50 localities.

Utinomi (1964–1969) recorded 21 species and 2 varieties from 11 localities, inclusive of 10 new localities, around the Japanese Islands, added 3 more species to the fauna and raised a variety up to the rank of species, thus the Japanese caprellid fauna consisted then of 61 species and 3 varieties of 14 genera from 60 localities.

Further, Arimoto (1970–1971) reported caprellids so far known in the Japanese waters into 68 species and 3 varieties of 5 genera. Of these, 22 species were actually examined by him and these studies resulted in addition of a genus and 3 species, including 105 new localities, in the Japanese caprellid fauna and elimination of a genus from it. Thus, the fauna presented by him had become to include 64 species and 3 varieties of 15 genera.

Recently, Utinomi (1973) recorded 23 species of 3 genera collected from 43 localities around the Japanese Islands, including 32 new localities, and thereby added a genus and a species. Thus, the fauna became to include 16 genera consisting of 65 species and 3 varieties from 197 localities.

Then, as seen in this paper, Arimoto recorded 65 species of 16 genera and 3 varieties, collected from 52 localities around the Japanese Islands, including 20 new localities; thus, 16 genera consisting of 65 species and 3 varieties from 217 localities were included in caprellids from the Japanese waters at the end of 1973.

Of these, Arimoto (1929–1973) obtained 35 species and 2 varieties of 6 genera, including 7 new species, from 196 localities and added 12 species and a variety and 3 genera to the Japanese fauna. This means that he has already examined caprellids from more than a lot of the whole 217 surveyed localities around the Japanese Islands and investigated more than half of 65 species and 3 varieties known from the Japanese waters, and that he has added 132 localities, and recorded newly 12 species and a variety. Of the 30 species inaccessible to Arimoto, 11 species were recorded from the depths of the Straits of Korea, 5 off Primorskaya, and the remaining 14 were either oceanic or so rare that they had been caught only once or twice till the end of 1973. These circumstances seem to justify that the taxonomical and distributional descriptions of the above-mentioned 35 species and 2 varieties of 6 genera may be regarded to show the outline of the Japanese caprellid fauna. Of course, it is very desirable that a complete monograph covering the whole known species is prepared, but this will require much more surveys of far offshore and deep waters, that might bring about a number of species new to Japan and science and of strange features.

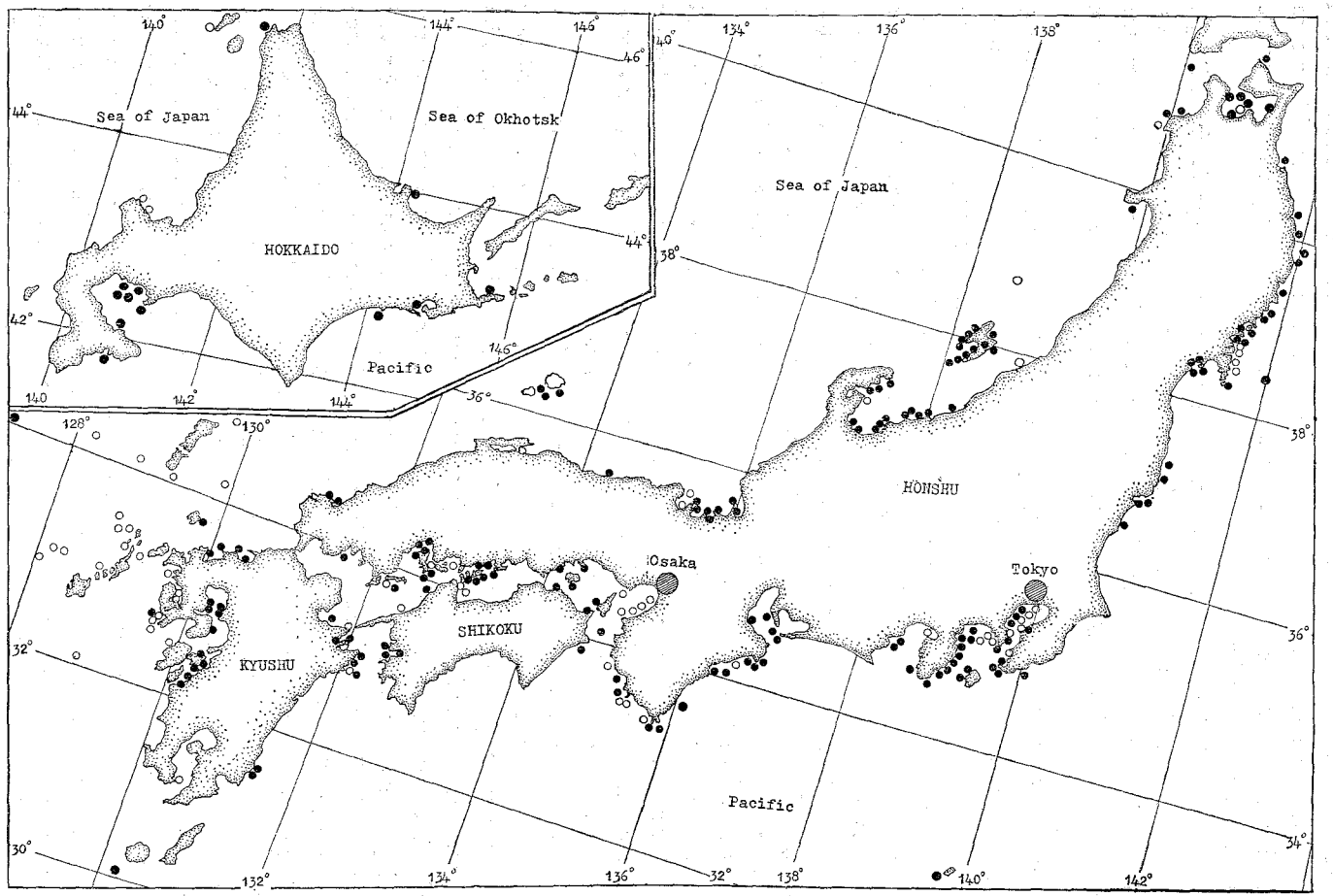

Fig. 2. Localities of the caprellids in Japan, recorded up to 1973.
● Localities referred to by the present author. ○ Localities referred to by other researchers.

B. Development and Sexual Dimorphism

The eggs are contained in the marsupium of the female, which is formed by 2 pairs of oostegites on pereonites III and IV. The cleavage is superficial, and the embryo develops into the nauplius and then metanauplius within the egg and is grown to generally 0.4 mm to 0.5 mm in size when hatching out. Although the hatched larvae are 1 mm or less in length, they are already provided with external characteristics similar to those of the adult. The larvae stay in the marsupium till they are liberated at moulting of the mother.

a. Ontogeny and Sexual Differentiation

The larval stage was studied in *Caprella equilibra* Say, as an example (Fig. 1).

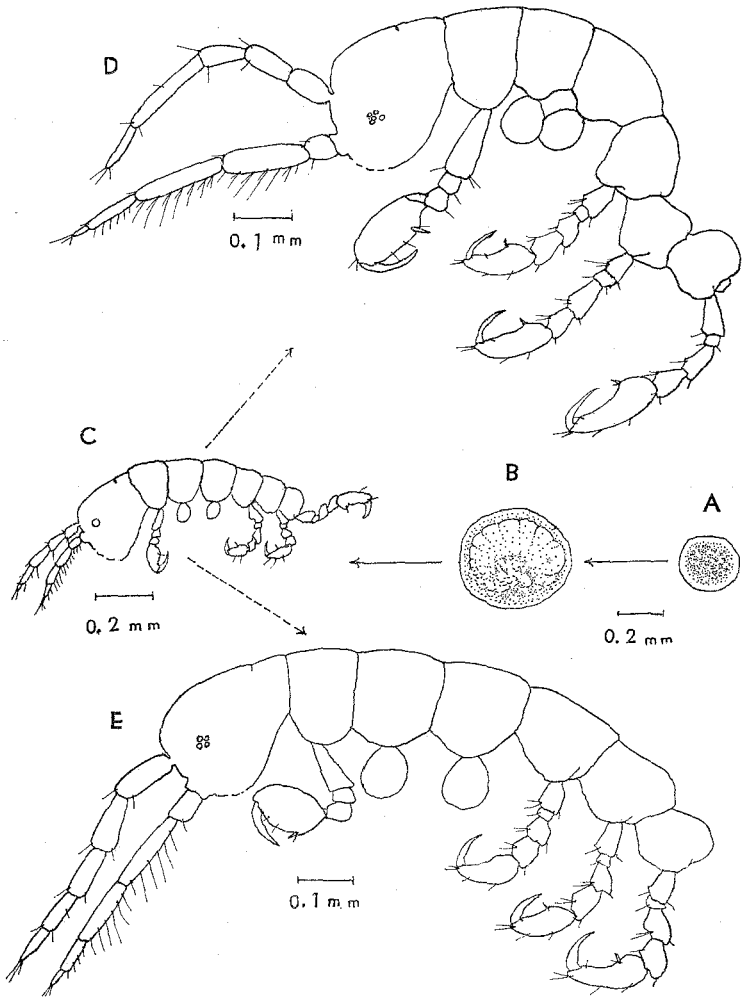

Fig. 3. Eggs and larvae of *Caprella* (*Rostrhicephala*) *equilibra* Say.
A, egg; B, just before hatching out; C, larva just hatched out; D, male larva; E, female larva. All based on the material from Kawana, Shizuoka Prefecture.

Immediately after hatching, the pereonites II-IV are nearly equal in length the shape. Antennae 1 and 2 are of the same size. The flagellum on antenna 1 is only 2 segmented at this stage, but increases the number of segments with growth, while the same structure on antenna 2 does not. The gnathopod 2 is small and the gill is round. The mouth part is nearly the same as that of the adult. The lateral plates of pereonites III and IV are projected ventrally in an arch in a number of specimens, but not so in others. In the former, the propodus of gnathopod 2 is rounded and shorter than in the latter. The former are believed to be females, while the latter males. The above-mentioned morphological differentiation has been confirmed in all actually studied species. The smaller individuals in which such definite sexual characteristics are not yet developed are called here the larval forms for convenience' sake.

Young Stage: The sexual differentiation becomes more obvious when the animals attain to about 4 mm in length. In males, antennae 1 and 2 are the same in length and the flagellum of antenna 1 has 5 segments, while there are 7 segments in females. In the latter, rudiments of the oostegite begin to appear on the base of gills. In males 9 mm long, each pereonite is extended to a shape similar to that in the adult, and the antenna 1 is longer than in females and bears 10 flagellar segments; the propodus of gnathopod 2 grows to a shape similar to that in the adult. Females of the same size are defined distinctly by their well developed oostegites.

Adult Stage: The females over 9 mm in length are regarded here as in the adult stage, as no further significant changes occur in their morphology. In the males, however, the antenna 1 extends further with the growth till it may attain to 3 times as long as the antenna 2 in a specimen 18 mm long; pereonites I and II grow much longer than the others; the elongation seems to occur near the junction between these somites and this feature is the best indication to distinguish the male from the female.

b. Development of Secondary Sexual Characteristics

Sexual differences are observed in size and shape of the body and gnathopods, formation of oostegites and in other structures.

Body Size: Females seemingly reach the adult-stage at the body length of 7.5 mm or so, while males at about 18 mm. This is because, as usual in oviferous crustaceans, the females can never moult while the eggs are nursed in their marsupium.

Hairy and Dorsal Spines: Old adult males are, in some species, furnished with sensory hairs each innervated at the base. These spines are regarded as sensory and distributed on the longer pereonites I and II in *Caprella acanthogaster* Mayer, on the gnathopod 2 in *C. monoceros* Mayer, or over the whole body in *C. drepanocheir* Mayer. Thus the sensory hairs are believed to have developed characteristically in such carpellids which are enormously elongated.

Sexual difference is seen in some cases, too, in the dorsal spines. For instance, in *Caprella scaura* the females bear large spines, but the males have none. These

spines begin to appear in females at 6 mm in body length and grow to be a triangular tubercle projecting out from the body surface when the animals attain to 8 mm, but ultimately the tubercles will be sharply pointed apically in fully grown up individuals 10.2 mm long or so.

Oostegites: Two pairs of flat and leaf-like oostegites are formed in females.

Other Structures: The propodus of gnathopod 2 is generally much stronger in males than in females. It is reported that the male of a peculiar form, *Heterocaprella,* is provided with a long clavate projection on the ventral surface of the pereonite IV (Arimoto 1975).

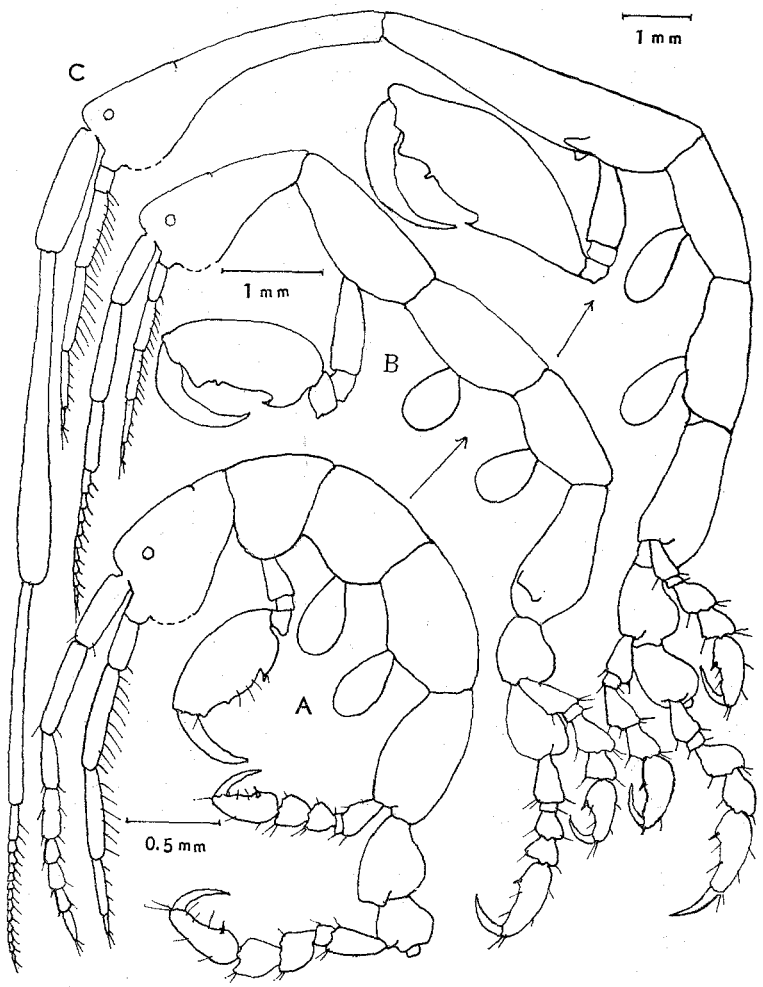

Fig. 4. *Caprella (Rostrhicephala) equilibra* SAY, male.
A, 4 mm long young (Coll. no. 348 from Kawana, Shizuoka Prefecture); B, 9 mm long young (Coll. no. 191 from Otomi Bay, Fukui Prefecture); C, adult, 18 mm in length (Coll. no. 347 from Kawana, Shizuoka Prefecture). After Arimoto (1971).

C. Morphological Criteria at Different Classification Levels in Caprellids

a. Morphological Characteristics of Caprellids and Their Systematic Significance

Many caprellids lack pereopods 3–4 but have well developed pereopods 5–7 instead, which help them to hold themselves to substratum materials on which they live. On the other hand, there are some caprellids that are provided with slender pereopods 3–7 that enable them to crawl around over the sandy or muddy sea floor. Many of the morphological characteristics that are respectively associated with

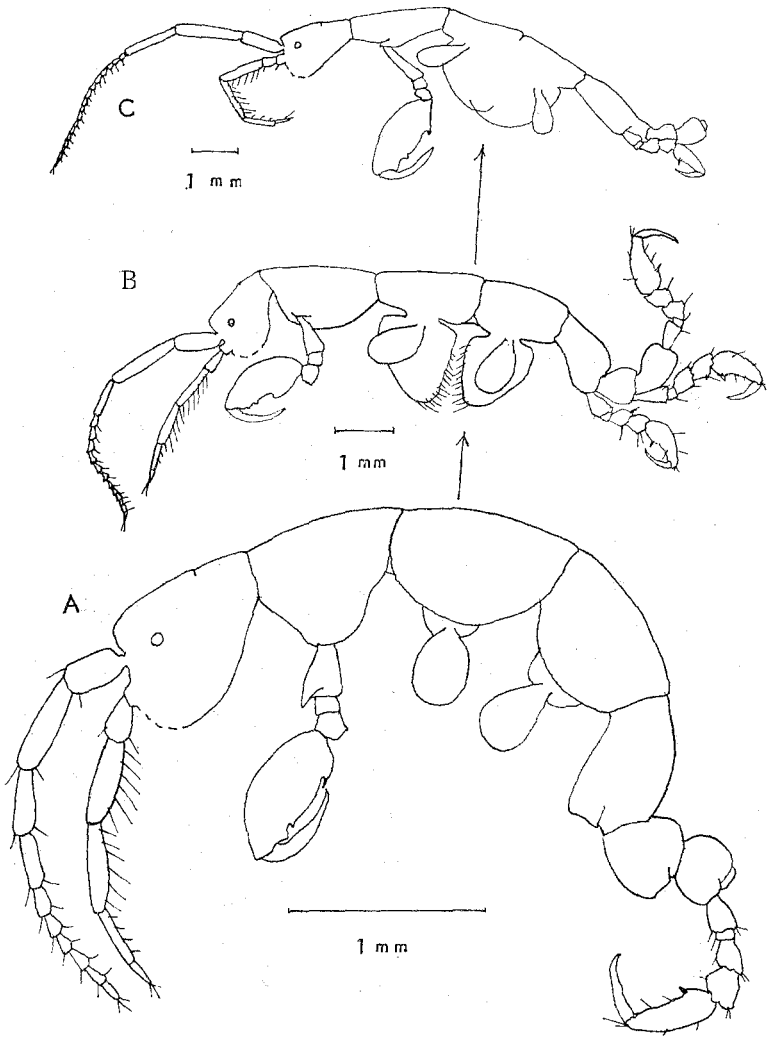

Fig. 5. *Caprella* (*Rostrhicephala*) *equilibra* SAY, female.
A, 4.5 mm long young (Coll. no. 350 from Kawana, Shizuoka Prefecture); B, adult, 9 mm in length (Coll. no. 349 from the same locality); C, adult,10 mm in length (Coll. no. 93 from Misaki, Kanagawa Prefecture).

different behaviors of the animals hardly correspond to their systematic relationship, though some ones seemingly can be regarded as significant phylogenetically. The number of pereopods referred to above and that of abdominal segments as well as the morphology of adbominal appendages are the examples of the latter category.

It is generally believed that caprellids are a family of the amphipod Crustacea derived from gammarids. While the latter are provided with 6 abdominal segments and 7 pairs of pereopods, the former, with a few exceptions, bear only 1 abdominal segment and lack pereopods 3–4. As the ancestral Crustacea is generally supposed to be provided with a pair of biramous appendages on each segment,

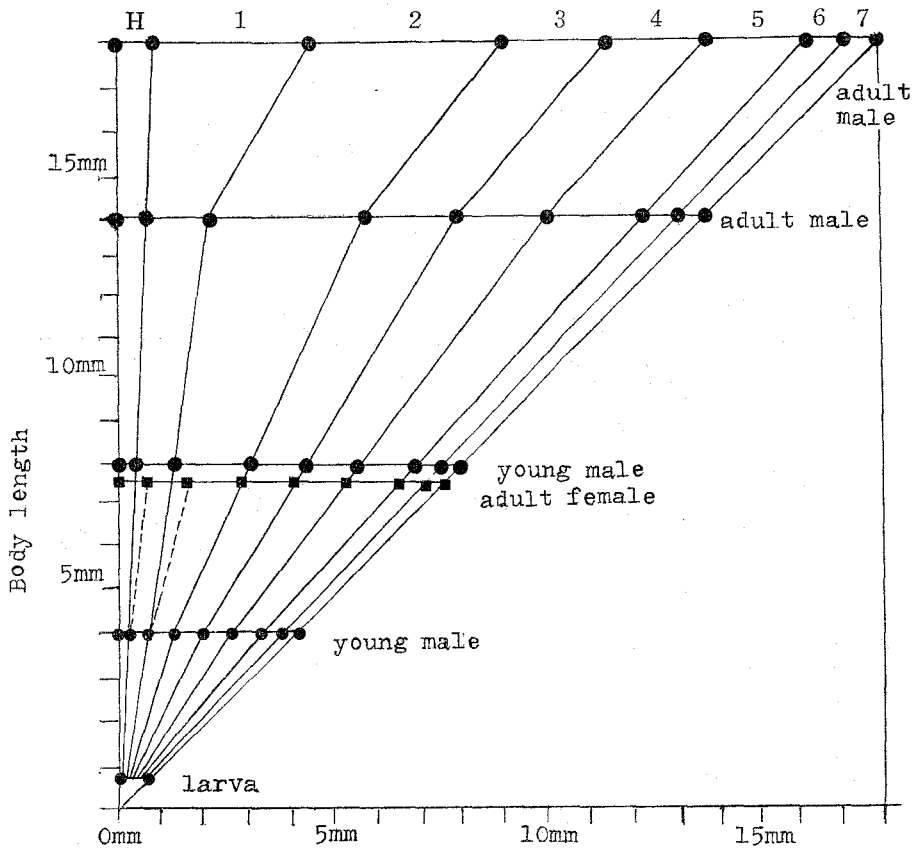

Fig. 6. Length of head and pereonites I-VII in 6 individuals of differemt sizes of *Caprella* (*Rostrhicephala*) *equilibra* Say.
The abscissa shows lengths of head and pereonites I-VII: H, head; 1–7, pereonites.

both the decrease of abdominal segments and missing of some pereopods in caprellids undoubtedly suggest their process of retrogressive evolution from the ancestral Crustacea. As far as this process is admitted, the decrease of abdominal segments to only one and gradual reduction of pereopods 3–4 leading to their complete missing should be taken as the diagnoses defining the higher systematic level in caprellids, while the results of processes of differentiating specialization that have proceeded

in parallel with the afore-mentioned process should be regarded as the diagnoses suggesting the systematic relationships between species.

b. Criteria of Families and Subfamilies

Mayer (1882–1903) described all caprellids under the single family Caprellidae. Much later, Kudrjaschov and Vassilenko (1966) discovered *Caprogammarus* having

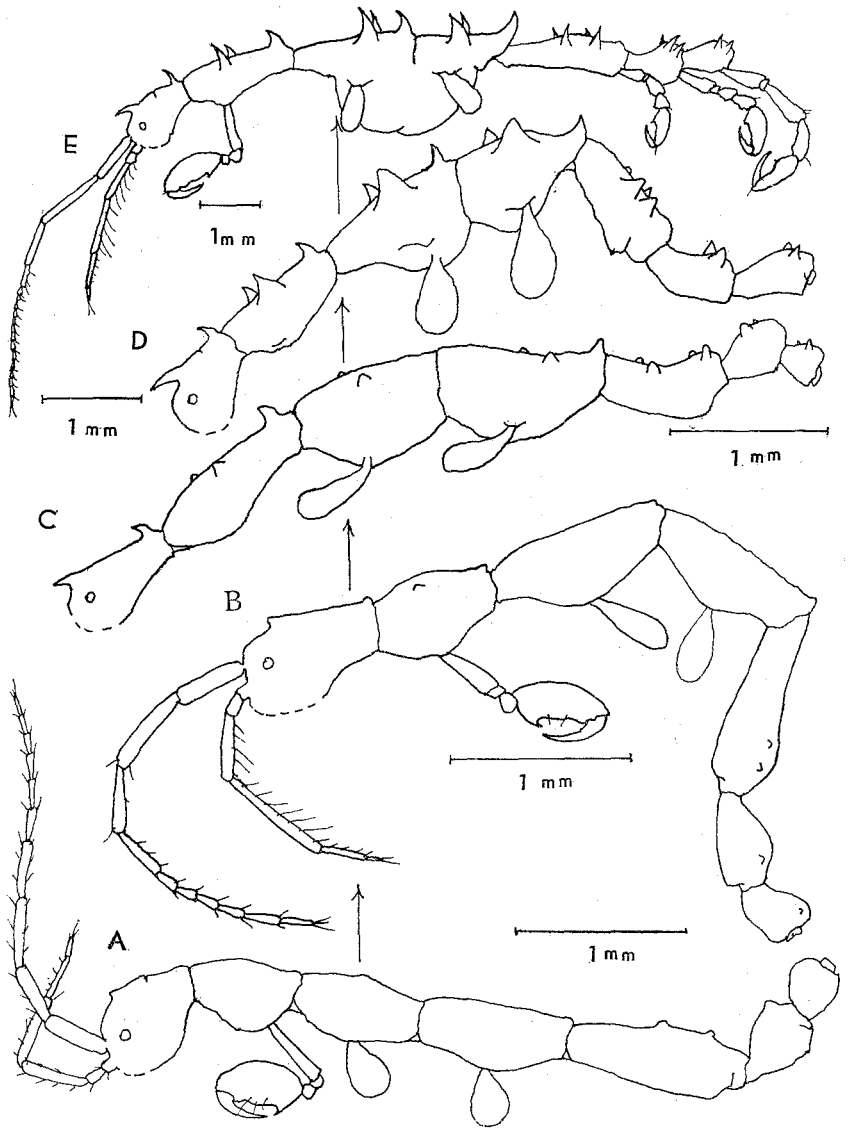

Fig. 7. Development of dorsal spines in female of *Caprella* (*Spinicephala*) *scaura diceros* Mayer. A, 4.8 mm long specimen (Coll. no. 382 from Lake Kamo, Niigata Prefecture); B, 5.5 mm long specimen (from the same locality); C, 6 mm long specimen (from the same locality); D, 8 mm long specimen (Coll. no. 179 from Chita, Aichi Prefecture); E, 10.2 mm long specimen (Coll. no. 184 from off Usuki, Oh'ita Prefecture).

several abdominal segments and established the family Caprogammaridae to hold this genus and to appreciate the difference between it and members of the Caprellidae. Then, Vassilenko (1968), noting that the abdomen of *Cercops* was divided into several segments and, further, their appendages were morphologically different from those of *Caprogammarus,* established the new family Paracaprellidae to separate *Cercops* from the Caprellidae, and further subdivided the Caprellidae into 4 subfamilies of Phtisicinae, Dodecadinae, Aeginellinae and Caprellinae.

Further, McCain (1970) divided caprellids into two groups, one consisting of 3 families of Caprogammaridae, Aeginellidae, and Caprellidae, which are all provided with a molar tubercle on the mandible, and the other including only the family Phtisicidae which is devoid of such a molar tubercle, and presented a supposition

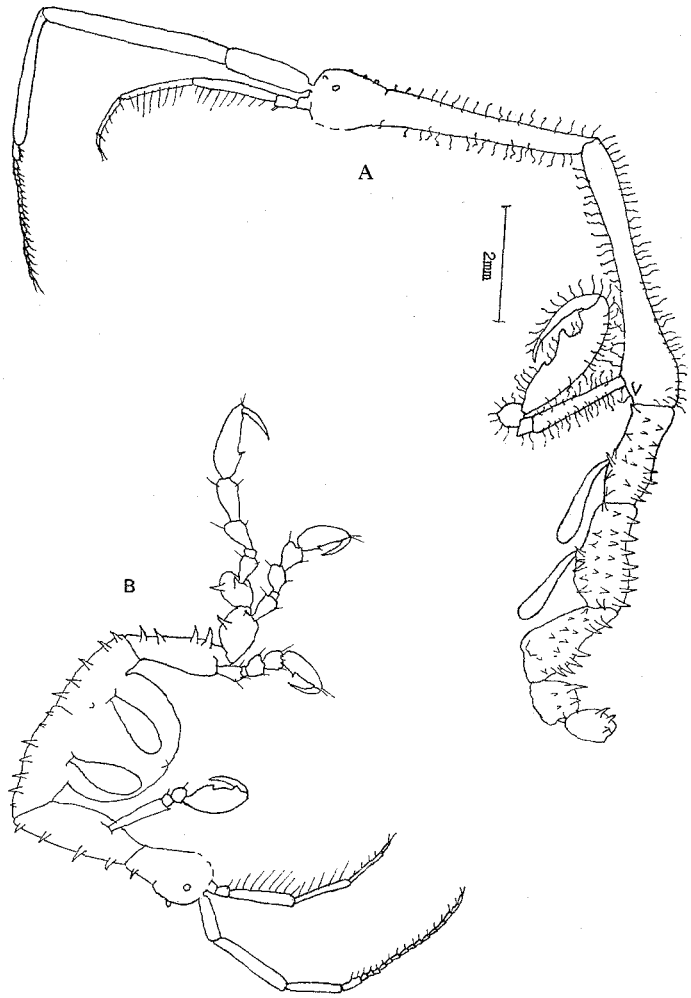

Fig. 8. Body spines in *Caprella* (*Spinicephala*) *acanthogaster* Mayer.
A, 18 mm long male (Coll. no. 164 from Kesennuma Bay, Miyagi Prefecture); B, 14 mm long female (Coll. no. 180 from Hirota Bay, Iwate Prefecture).

that these 2 groups have differentiated from the same hypothetical Podocerid-like ancester, derived directly from Gammaridea. As there are known now so many as 238 species of caprellids, it might be a way of classification to divide them into 3 or 4 families. However, some serious questions are left as to such a classification of defining families or subfamilies on the morphology of appendages and their derivatives, as will be discussed later. Therefore, McCain's classification is not followed in this paper, but all caprellids are included in the single family Caprellidae after Mayer (1882–1903), which is then divided into 2 subfamilies of Caprellinae (Leach, 1814) and Caprogammarinae (new subfamily), and *Caprogammarus* and *Cercops* are included in the latter according to McCain. This is based upon the idea that the retrogressive specialization of the abdomen is the most remarkable and essential feature in caprellids, and that subfamilies should be defined on further details of the diagnostic characters of the family.

c. The Generic Criteria

Mayer (1882–1903) presented the following 7 points as the generic criteria in caprellids. Presence or absence of swimming setae on the 2nd antenna; number of flagellar segments of the 2nd antenna; distribution of pereopods and number of segments of respective pereopods; number of gills; presence of absence of the mandibular palp, and when present, number of its segments and number of setae on the terminal segment; relative size of outer and inner lobes of the maxilliped; and number of abdominal appendages and number of segments in respective appendages. Of these, next 5 points are accepted here as valid.

1) Number of flagellar segments of 2nd antenna. There are two groups in caprellids, one including *Phtisica, Protomima, Paraproto, Metaproto, Protogeton, Dodecus, Caprellina,* etc., all provided with more than 3 flagellar segments on the 2nd antenna; while the other including *Aegina* and *Caprella,* in which the 2nd antenna has just 2 flagellar segments. This difference is clearly manifested already in the larval stage.

2) Distribution of pereopods and number of segments of respective pereopods. Morphological changes of pereonites and appendages have been taken as important generic diagnoses in caprellids since Leach (1814). As the retrogressive evolution is assumed in the phylogeny of caprellids, as mentioned above, the reduction of number of pereonites or appendages is apparently of a systmatic significance. And this will justify that the number of pereopods and that of segments of respective pereopods are adopted as generic criteria.

3) Number of gills. The gill is an organ produced out from a part of the basement of pereopods. Since a regular relation is maintained between the number of gills and the affinity between genera defined by other characters, the number of gills may be available as a generic criterion in caprellids.

4) Presence or absence of the mandibular palp and when present, number of its segments. Homology between the oral parts and pereopods has been discussed repeatedly and, though there remain still a few questions (Handlirsch, 1925–

1927), it has been generally accepted that the mandibular palp is a partial homologue of the pereopod. As the characters of pereopods are admitted as the generic criteria, the presence or absence of the mandibular palp, and when present, the number of its segments are naturally available to the same purpose.

5) Distribution of abdominal appendages and number of segments of respective appendages. Various features of the abdominal appendages can be used as the generic criteria, because these appendages are quite equivalent to pereopods. When there are differences between the male and female in the distribution of abdominal appendages and the number of segments of respective appendages, these may constitute a part of generic diagnoses.

As mentioned above, McCain (1970) particularly took the existence of the mandibular palp in association with the presence of the molar tubercle for a diagnosis to define families. On the other hand, characters of the pereopods and abdominal appendages were taken by the same author for generic diagnoses. The classification proposed by him is unapproved unless it is clearly explained why features of the mandibular palp that is homologous to preopods and abdominal appendages can be the diagnosis to define families.

Thus, in this paper a few parts of the generic diagnoses proposed by Mayer (1882–1903) are transferred to the specific diagnoses to make the generic diagnoses simpler and more consistent. And ultimately, the generic diagnoses are here unified to the points concerning the morphological variation in appendages as seen above.

d. The Subgeneric Criteria in the Genus *Caprella*

The shape of the head is newly adopted here as a subgeneric criterion in the genus *Caprella*. Three types of the head shape are definable; and this is particularly noteworthy in the classification of the species of the genus *Caprella*, as explained later in detail. It is proposed here to subdivide the genus *Caprella* into 3 groups as follows.

1) Subgenus *Caprella* s. str. The head is spherical or oval and devoid of any spines. As such a shape is evidently reflecting a lower level of differentiation, this group is presumably situated nearest to the primitive form of caprellids.

2) Subgenus *Spinicephala* n. subgen. The head of adult forms is spherical or oval, but provided with one to several upright dorsal spines. The formula and shape of these spines are almost stable within each species.

3) Subgenus *Rostrhicephala* n. subgen. There is a forward spinal projection from the dorsal front of the head. This feature is discernible just after hatching.

By introducing the head shape, divisible into 3 distinct types, into the taxonomic diagnosis, the classification of *Caprella* has been much simplified as follows.

The genus *Caprella*, that is the type genus of the Caprellidae, includes much more species than other genera, a total of 114 known species. Various keys for such many species have hitherto been constructed from various points of view. But,

none of them is simpler or more plain than the key presented in this paper, that splits the whole species into 3 groups by the shape of the head. As the head types seem to be significant systematically, the key presented in this paper will show some systematic relations between species within the genus. The order of describing species now largely conforms to the systematic order, so that affinities can be more easily recognized between the species which are described adjacently. All these seem to justify to establish 3 subgenera in the genus *Caprella,* on their head shape.

e. The Specific Criteria

The specific descriptions in caprellids have been made exclusively after the style of Mayer (1882–1903), without any close examination being made on the specific diagnoses. On the other hand, the classification and descriptions of caprellids in the past were made on either or both of the male and female adults, but paying no attention to the young. This has brought about some confusions and difficulties in the classification of caprellids, in particular, within the genus *Caprella,* in which really the emendation of species has been rather frequent. It was not rare that the young and adult of the same species were described under different names or that the young female was mistaken for the male. Such confusions were caused essentially by that the general and consistent specific diagnoses had not yet been given. Many examples of the pronounced sexual dimorphism or the developmental changes of the external morphology with growth and ecdyses, are known so that it is not rare that the young and adult of the same animal look like different species.

In this paper, it is proposed to simplify and standardize the specific diagnoses in caprellids as follows:

1) Relative length of pereonites. This concerns only the male. In a group of caprellids the relative length of pereonites is nearly stable through the life history from the larval to adult stage, while in the other the pereonites I, II, or V will be lengthened more remarkably than other pereonites in growth (Fig. 4). These different growth patterns of pereonites are available as the specific criteria.

2) Length of lst antenna. The lst antenna manifests a considerable variation in length, that can be regarded as specific.

3) Projection on body surface. So-called dorsal, lateral and ventral projections of caprellids are respectively the protrusions of the surface cuticle of pereonites and appear with growth, but some appear or disappear at some ecdyses. Any characteristic patterns of the appearance or disapperance, or any morphological characteristics of those projections are available as specific criterian.

4) Incisor and molar tubercles of mandible. Mayer (1882–1903) regarded the characters of both tubercles as the specific criteria, while McCain (1970) took the presence or absence of the molar tubercle, as mentioned proviously, for the diagnosis to define families. Mayer's view is followed in this paper. The molar tubercle is a partial projection of the mandibular coxa and presumably the same as the incisor tubercle in the origin. And actually only a group of Phtisicidae (McCain, 1970) is devoid of such tubercles. It seems very simple and clear to pro-

vide 4 families in caprellids on the presence or absence of the molar tubercle. But this classification will become acceptable only after the following points are checked carefully: (a) phylogenetic significance of the molar tubercle, (b) phylogenetic relation between caprellids, in particular Phtisicidae (McCain, 1970), and gammarids, (c) possibility of difining families on the morphology of the mandible in Gammaridea, closely related to Caprellidea, and particularly, (d) possibility that the formation of the molar tubercle is only an ecotypic structure, because the molar tubercle is generally found in omnivorous species inhabiting shallows, but never in carnivorous species living in the deep waters within any single genus distinctly defined by other criteria.

5) Relative size of inner and outer lobes of maxilliped. Mayer (1882–1903) took the relative size of the inner and outer lobes for a generic criterion. The inner and outer lobes are leaf-like partial projections of the basis and a part of the podite respectively, and then presumably are homologous to the outer lobe of the lst maxilla and other appendages. Actually, the outer lobe of the maxilliped is almost equal to or somewhat larger, but never smaller than the inner lobe. This means that the relative size of these lobes is merely a feature showing the grade of difference and then it cannot be more than a specific criterion.

6) Presence or absence of swimming setae on 2nd antenna. Mayer (1882–1903) took the presence or absence of swimming setae on the 2nd antenna for a generic criterion, but this is transferred to the specific criterion in this paper. The presence of swimming setae is confirmed in 4 genera of caprellids, but in the genus *Caprella* one with and the other has no swimming setae. With such a great exception in the genus *Caprella,* it is impossible to admit the presence or absence of swimming setae as a general generic criterion.

7) Setal formula on terminal segment of mandibular palp. Mayer (1882–1903) noticed that the setal formula on the terminal segment of the mandibular palp is seemingly characteristic to respective genera and took this for an important generic criterion. The formula has been widely applied since then to define genera in caprellids as a simple and plain criterion, though resulting in some confusions.

Ontogenetically, these setae are homologous to the swimming setae of the 2nd antenna. Thus, the number may change with growth and ecdyses, and in some caprellids it does not follow the generic setal formulae proposed by Mayer (1882–1903). Further, it has been confirmed that the setal formula differs even between species of the same genus. For example, the setal formula is 0–1–0 in *Deutella californica* (Mayer, 1890), while 1–4–0 in *D. venenosa* (Mayer, 1890); 1–x–y–1 in *Metaprotella haswelliana* (Mayer, 1882), but 1–2–1 in *M. makrodactylos* (Stebbing, 1910); and 1–4–1 in *Phtisica marina* (MaCain, 1968), while 0–2–0 in *P. antillensis* (McCain, 1968). On the other hand, a close examination of the 3 specimens of *Monoliropus tener* in different growth stages revealed that the setal formula changed with growth as 1–3–0 → 1–3–1 → 1–4–1, though Mayer (1903) gave the setal formula of 1–1–1 to the genus *Monoliropus.*

Though it is admitted that Mayer (1882–1903) described species only on adult

forms, the setal formula on the terminal segment of the mandibular palp can not be significant as a generic criterion, it may be significant only at the specific level.

8) Palmar spines. The propodus of the 2nd gnathopod and pereopods 3–7 is provided with 1 or 2 palmar spines in many caprellids. As these spines are homologous to the swimming setae of the 2nd antenna and the setae on the terminal segment of the mandibular palp, their feature can be taken for a specific criterion. However, these spines may appear or disappear with ecdyses even within the same species; for example, in the male of *Caprella penantis* the propodus of the 2nd gnathopod will lose such spines in the adult form, changing its shape into a special conformation. Thus, the palmar spines can be a specific criterion only under the careful check of their developmental changes.

9) Penes. The penes located at the medial or lateral part of the posterior edge of pereonite VII are available as a specific criterion.

10) Growing process. Caprellids undergo several ecdyses and change their form in the growth to the adult form. Nevertheless, descriptions of caprellids made in the past seldom referred to their growing process in detail. Furthermore, larvae have been generally left unidentified. However, all the larvae obtained by Arimoto (1929–1971) have been identified and are described in the present paper. By this, the specific morphologies of larvae have been revealed as well as the successive morphological changes in growth. And this will justify to take the growing process and larval morphologies for the specific criteria.

11) Sexual differences in morphology. Among the different morphologies between the male and female, the number of abdominal appendages and that of segments of respective appendages have already been referred to as to their availability as the generic criteria. The feature of projections of pereonites, that is different between the male and female, can be adopted as a specific criterion. For instance, in some caprellids, the male and female are furnished quite similarly with such projections, while in the others the male and female are armed differently; i.e. the female bears a number of large projections, while the male of the same species lacks these.

12) Other characters. In addition to the morphological features afore-mentioned, there are known some other characters that have been taken for the specific criteria. For example, the shape of the propodus of the 2nd gnathopods has been frequently used in some species for a specific criterion. However, in many caprellids, the propodus of this appendage undergoes a complete transformation in growth, though few papers have ever referred to this in detail.

As mentioned above, the retrogressive modification of the abdomen is regarded as the diagnosis of the family, and subfamilies are defined by the number of abdominal segments. The generic criteria are simplified to include only the features of appendages inclusive of gills, such as the distributional pattern and the number of segments of respective appendages. Of the generic criteria adopted by Mayer (1882–1903), features of the swimming setae of the 2nd antenna, the setae of the

terminal segment of the mandibular palp, and the relative size of the inner and outer lobes of the maxilliped are moved to the specific criteria. Summarizing all those mentioned previously, the specific criteria are defined here as follows, with several additions to those defined by former researchers (the newly added criteria are marked with an asterisk).

A. Criteria Related to Pereonites.

1) Length of each pereonite*, 2) successive changes of respective pereonites with growth*.

B. Projections on the Pereonite Surface.

Dorsal, lateral and ventral projections on pereonites other than head.

C. Secondary Projections on Appendages.

Such as, 1) incisor tubercle of mandible, 2) molar tubercle of mandible (criterion to define families according to McCain, 1970), and 3) relative size of inner and outer lobes of maxilliped (generic criterion according to Mayer, 1882–1903).

*D. Ratio of Length of Ist Antenna to Body Length**.

E. Setae on Appendages.

Such as, 1) swimming setae on 2nd antenna (generic criterion according to Mayer, 1882–1903), 2) setae on terminal segment of mandiblar palp (generic criterion according to Mayer, 1882–1903), and 3) palmar spines on propodus of 2nd gnathopod and pereopods.

*F. Morphological Changes with Growth Other Than That Given in A-2**.

G. Sexual Differences, but Excluding That Concerning Abdominal Appendages and Taken for a Generic Criterion.

H. Others.

As mentioned above, the criteria at different systematic levels in caprellids were reexamined and rearranged to make the classification procedure much simpler than before. That is, characters of homologous structures checked phylogenetically are all assigned to the criteria at the same systematic level unless there is an obvious reason to assign any of them to the criteria at different levels. Further, the characters of the phylogenetically fundamental structures in caprellids are regarded in this paper as the criteria at higher systematic levels, while the secondary characters, seemingly not yet fixed stably, such as those variable in some significant range and involving many intermediate ones, those that undergo a great ecological modification, and so on, are all assigned to the criteria at lower systematic levels, even if they are taken up.

As far as the species described in this paper are concerned, the above-mentioned procedure of classification seems to be available without any difficulties, but this never assures that the procedure is available generally throughout the whole caprellids; the last mentioned should be checked by future studies.

Before going further into the taxonomical descriptions, the outline of classification of caprellids above the subfamilial level, as proposed by Arimoto in this paper, may be shown briefly as compared with those presented by previous resear-

chers.

Authors	Families	Subfamilies
Mayer (1882–1903)	Caprellidae	
Kudrjaschov and Vassilenko (1966)	Caprogammaridae Caprellidae	
Vassilenko (1968)	Caprogammaridae Paracaprellidae Caprellidae	Phtisicinae Dodecadinae Aeginellinae Caprellinae
McCain (1970)	Caprogammaridae Aeginellidae Caprellidae Phtisicidae	
Arimoto (in the present paper)	Caprellidae	Caprogammarinae Caprellinae

PART TWO

V. TAXONOMICAL DESCRIPTIONS

A. Family Caprellidae Leach, 1814

Caprellines Lamarck, 1812, Extrait. Cours. Zool., 91.
Caprellini Leach, 1814, Brewster's Edinburgh Encycl., 7: 403.
Caprellides Leach, 1814, Brewster's Edinburgh Encycl., 7: 433.
Caprellidea Dana, 1852, Amer. Journ. Sci. Arts., (2) 14: 300?, 307.
Caprellina Boeck, 1876, Skandinaviske Amph.: 668.
Caprellidea McCain, 1970, Caprellidea I, Crust. Catal., 2: 4.

1) Subfamily Caprogammarinae, n. subfam.

Caprogammaridea Kudrjaschov and Vassilenko, 1966, A new family Caprogammaridea found in North-West Pacific, Crust. 10 (2): 192–198, figs. 1–4.

DIAGNOSIS: Accoroding to the original description. Body elongate, with seven free thoracic somites. Gnathopod 2 normal. Pereopods 3 and 4 almost reduced to poverty. Abdome 6-segmented, but the last two fused.

This subfamily is represented by two genera, *Cercops* and *Caprogammarus*, at the date of the end of 1973.

Genus *Cercops* Kröyer, 1843

Cercops Kröyer, 1843, Naturh. Tidsskr., 4 (6): 496.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; pereopods 3 and 4, 1-segmented, pereopod 5, 6-segmented; gills on pereonites II, III and IV; mandibular palp 3-segmented; abdomen of male with 2 pairs of biarticulated elongate appendages and 2 pairs of lobes, female with 2 pairs of appendages.

TYPE SPECIES: *Cercops holboelli* Kröyer, 1843.

1. *Cercops holboelli* Kröyer, 1843

(Jap. name: *Haranaga-warekara* Arimoto, 1970)

Fig. 9.

Cercops Holbölli Kröyer, 1843, Naturh. Tidsskr., 4 (6): 504–509, pl. 6 figs. 1–13. ——Kröyer, 1846, Voy. Scandinavie, Laponie, Spitzberg et Féröe: pl. 24 fig. 2. ——Bate, 1862, Catal. Amphip. Crust. British Mus.: 352, pl. 55 fig. 6. ——Boeck, 1871, Forh. Vidensk. Selsk. Christiania, 1871: 269 (189)–270 (190). ——Boeck, 1876, Skandinaviske Amphipoder: 675–676. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 20–21, figs. 1–2. ——Stuxberg, 1882 in Nordenskiöld, Vega Exped. Vetensk, Iakttagelser, 1: 764. ——Hansen, 1887, Vidensk. Medd. naturh. Foran. Köbenhavn, (4) 9: 171.——

Mayer, 1890, Fauna Flora Gol. Neapel, 17: 10, pl. 1 figs. 1–2, pl. 3 figs. 1–3, pl. 5 figs. 1–2, pl. 6 fig. 32. ——Vanhöffen, 1897, Grönland Exped. Gesellsch. Erdkunde Berlin, 2 (1): 213. ——Mayer, 1903, Siboga Exped. Mon., 34: 17–18, pl. 1 figs. 1–2, pl. 6 figs. 1–3, pl. 9 figs. 1, 29, 30, 47. ——Utinomi, 1947, Seibutsu, (suppl.) 1: 69. ——McCain, 1968, Bull. U. S. Nat. Mus. 278: 107–112, fig. 49e-f.

Cercops Holboelli, Lütken, 1875, in Jones, Man. Nat. Hist., Geol. Greenland: 159. ——Stephensen, 1913, Medd. Grönland, 22 (1): 220.

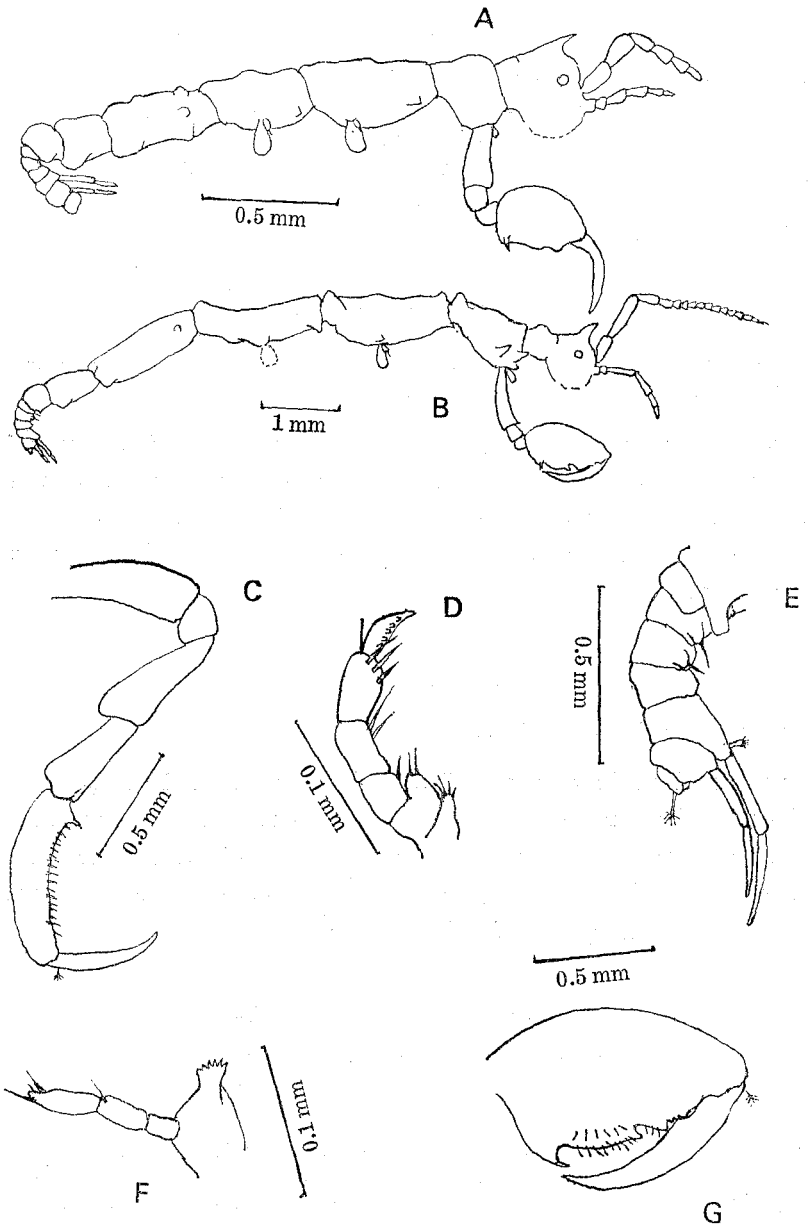

Fig. 9. *Cercops holboelli* Kröyer (after Mayer).
A, young female; B, male; C, pereopod 7; D, maxilliped; E, abdomen of male; F, mandible; G, propodus of gnathopod 2. (Dundeer Museum materials).

Cercops holbolli, d'A. W. Thompson, 1901, Catal. Crust. Mus. Dundee: 41.

Cercops holbölli, Stephensen, 1933, Medd. Grönland, 79 (7): 77. ——Stephensen, 1944, Medd. Grönland, 121 (14): 159. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 13. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (5): 24, figs. 1–7.

Cercops holboelli, McCain, 1970, Crust. Catal. 2, Caprellidea 1: 48.

No specimen in the author's collection.

DESCRIPTION: After Mayer's (1903) based on material at the Dundeer Museum.

Male: Body length 8 mm (Text-fig. 9); back of body spinose, head with one acute frontal spine, pereonites III-V about equal in length, pereonite II shorter than III-IV, VI shorter than II, VII shorter than VI, a large lateral tubercle on each rear part of pereonites II-V, but similar one persent on each side of fore part of each segment of pereonites II-IV.

Antenna 1 about one-third of body length, its flagellum 11-segmented; antenna 2 shorter than peduncle of antenna 1, its flagellum composed of 2 segments and lacking swimming setae; mandibular palp with 3 segments and setal formula of terminal segments 3, molar absent; inner lobe of maxilliped very small, and with several apical spines, outer lobe very small but larger than the inner, and with several apical spines, palp of maxilliped with 4 segments, segment 4 sharp.

Gnathopod 2 lies to rear of pereonite II, its basal segment rather shorter than propodus in length, a palmar spine at base of palm of propodus, poison tooth situated at center of palm, distal angle of palm triangular.

Pereopods 3 and 4 each single-semgented, pereopods 5, 6 and 7, 6-segmented, propodus of 7th pereopod long and with a small palmar spine; gills oval, attached to pereonites II, III and IV.

Abdomen of male with 2 pairs of biarticulate elongate appendages and 2 pairs of lobes, female with 2 pairs of appendages.

DISTRIBUTION: Type locality: Greenland, 109.2 m.

Locality around Japan: Tsugaru Straits (Mayer 1903: 143).

REMARKS: This species seems to be primitive among caprellids, in having abdomen of several segments, with 4 pairs of appendages.

Since this species was first described from the South Greenland Sea it had not been found around Japan until a single collection was made in the Tsugaru Straits (Mayer 1903). However, Utinomi (1947: 69) thought that it was perhaps distributed to the Far East seas by having attached to the hull of ocean-going boats. Mayer, on the other hand, did not give any clear description of the material from the Tsugaru Straits.

2) Subfamily Caprellinae Leach, 1814

Caprellines Lamarck, 1812, Extrait Cours Zoll.: 91.

Caprellini Leach, 1814, Brewster's Edinburgh Encycl., 7: 403.

Caprellines Lamarck, 1817, Hist. nat. Anim. s. Vert., (ed. 1) 5: 171.

Caprellidae Samouelle, 1819, Entomol. usef. Compendium: 105.

Filiformia Latreille, 1825, Familles Regne Anim.: 287.
Loemodipodes Filiformes H. Milne Edwards, 1841, Hist. nat. Crust., 3: 105.
Caprelliens H. Milne Edwards, 1841, Hist. nat. Crust., 3: 105.
Caprellidae White, 1847, List. Crust. Brit. Mus.: 91.
Phtisicinae Vassilenko, 1968, Doklady Akad. Nauk. USSR. 183 (6): 1462.
Dodecadinae Vassilenko, 1968, Doklady Akad. Nauk. USSR. 183 (6): 1463.
Aeginellinae Vasslenko, 1968, Doklady Akad. Nauk. USSR. 183 (6): 1463.
Caprellinae Vassilenko, 1968, Doklady Akad. Nauk. USSR. 183 (6): 1463.
Phtisicidae McCain, 1970, Proc. biol. Soc. Washington, 82: 838.
Aeginelidae McCain 1970, Proc. biol. Soc. Washington, 82: 839.
Protellinae McCain, 1970, Proc. biol. Soc. Washington, 82: 839.

DIAGNOSIS: Body narrow. Gnathopod 2 normal. Abdomen one-segmented, abdominal appendages without exopodite. Mouth area normal.

This subfamily is represented in the Japanese waters by 64 species and 3 varieties of 15 genera, at the end of 1973.

Table 2. Genera of caprellids in Japan and its diagnostic characteristics

Genera	Antenna 2	Pereopod segments			Gills on pereonites			Mandible	Abdominal appendages	
	Segments of fragellum	3	4	5	II	III	IV	Segments of palp	male	female
Protogeton	3	6	6	6		×	×	1–2	0 ; 0	0 ; 0
Protomima	4	6	6	5	×	×	×	3	2 ; 0	2 ; 0
Pseudoproto	2	6	6	5	×	×	×	3	0 ; 0	?
Prellicana	2	0	0	3		×	×	3	1 ; 0	1 ; 0
Triperopus	2	3	3	3		×	×	3	?	0 ; 0
Paraprotella	2	3	3	6		×	×	3	1 ; 1	1 ; 1
Aciconula	2	2	2	6		×	×	3	?	0 ; 1
Noculacia	2	2	2	6		×	×	3	0 ; 1	0 ; 1
Monoliropus	2	1	1	6		×	×	3	1 ; 1	0 ; 1
Metaprotella	2	1	1	6		×	×	3	1 or 2 ; 0	0 ; 1
Protella	2	1	1	6		×	×	3	1 ; 1	0 ; 1
Paracaprella	2	2	2	6		×	×	0–2	1 ; 1	0 ; 1
Hemiaegina	2	1	1	6		×	×	0	1 ; 0	1 ; 0
Metacaprella	2	0	0	6		×	×	0	1 ; 1	1 ; 1
Caprella	2	0	0	6		×	×	0	1 ; 1	0 ; 1

Key to genera of the subfamily Caprellinae in the Japanese waters

1. a. Gills on pereonites II-IV 2
   b. Gills on pereonites III-IV 3
2. a. Flagellum of antenna 2 with 4 segments ..... *Protomima*
   b. Flagellum of antenna 2 with 2 segments ..... *Pseudoproto*
3. a. Pereopods 3–4 with 6 segments ..... *Protogeton*
   b. Pereopods 3–4 with 3 segments 4
   c. Pereopods 3–4 with 2 segments 5
   d. Pereopods 3–4 with 1 segments 6
   e. Pereopods 3–4 absent 8
4. a. Pereopod 5 with 6 segments ..... *Paraprotella*
   b. Pereopod 5 with 3 segments ..... *Triperopus*

5. a. Male abdomen with a pair of 1-segmented appendages and a pair of lobes ..... *Paracaprella*
   b. Male and female abdomen with a pair of lobes ..... *Noculacia*
   c. Male abdomen with a pair of appendages, but female without appendages ..... *Aciconula*
6. a. Mandibular palp absent ..... *Hemiaegina*
   b. Mandigular palp with three segments 7
7. a. Male abdomen with 2-segmented appendages ..... *Monoliropus*
   b. Male abdomen with 1- or 2-segmented appendages ..... *Metaprotella*
   c. Male abdomen with 1-segmented appendages ..... *Protella*
8. a. Pereopod 5 with 3- or 4-segments ..... *Prellicana*
   b. Pereopod 5 with 6-segments 9
9. a. Female abdomen with a pair of appendages and a pair of lobes ..... *Metacaprella*
   b. Female abdomen with a pair of lobes ..... *Caprella*

Genus *Protogeton* Mayer, 1903

Protogeton Mayer, 1903, Siboga Exped. Mon., 34: 28.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2 with 3–5 segments; pereopods 3–5, 6-segmented; gills on pereonites III and IV; mandibular palp 1- or 2-segmented; abdominal appendages of male and female absent.

TYPE SPECIES: *Protogeton inflatus* Mayer, 1903.

2. *Protogeton inflatus* Mayer, 1903

(Jap. name: *Itoashi-warekara* Arimoto, 1971)

Fig. 10

Protogeton inflatus Mayer, 1903, Siboga Exped. Mon., 34: 28–29, pl. 1 fig. 13, pl. 6 figs. 29–32, pl. 9 figs. 11, 35, 51. ——Hiro (=Utinomi), 1937, Annot. Zool. Japon., 16 (4): 310–311, fig. 1, pl. 22 figs. 1–2. ——Utinomi, 1947, Seibutsu, (suppl.) 1: 69. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 14. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (5): 29 figs. 4–5. ——McCain, 1970, Crust. Catal. 2, Caprellidea 1: 70.

No specimen in the author's collection.

OCCURRENCE: In Japan this species was first collected by Utinomi, 1 male from Tatigatani, Tanable Bay, Apr. 1937, attached to *Bugula neritina* (Bryozoa) (Hiro [=Utinomi], 1937: 310).

DESCRIPTION: According to Mayer's (1903:28). Male: Body length of specimen 10.25 mm (Text-fig. 10); slender and smooth, head intimately coalesced with pereonite I, pereonite V subequal to III and IV in length, pereonite II a little shorter than III, VI and VII taken together a little shorter than II.

Antenna 1 slightly shorter than half of body length, its flagellum composed of 20 segments; antenna 2 as long as two basal segments of peduncle of antenna 1, its flagellum nearly as long as last segment of peduncle and 3-segmented; mandibular palp with 1 segment (Mayer, 1903: 28, stated as 1 or 2), and setal formula of terminal joint, 1; outer lobe of maxilliped as long as inner lobe; two pairs of gnathopods quite characteristic in shape, though they do not exactly conform to original description by Mayer; gnathopod 1 with wrist about half as long as segment 1

of its peduncle, propodus about as long as wrist, and triangular in shape, palm bearing a spiniferous tooth at point where upper and lower setose margin rectangularly meet; gnathopod 2 long, slender and placed, to fore end of pereonite II, propodus more slender than that in Mayer's figure, with a blunt tooth near base of finger and with two spines below middle; no other projection found on nearly straight palm margin; pereopods 3 and 4 with 6 segments, which are long, slender and subequal

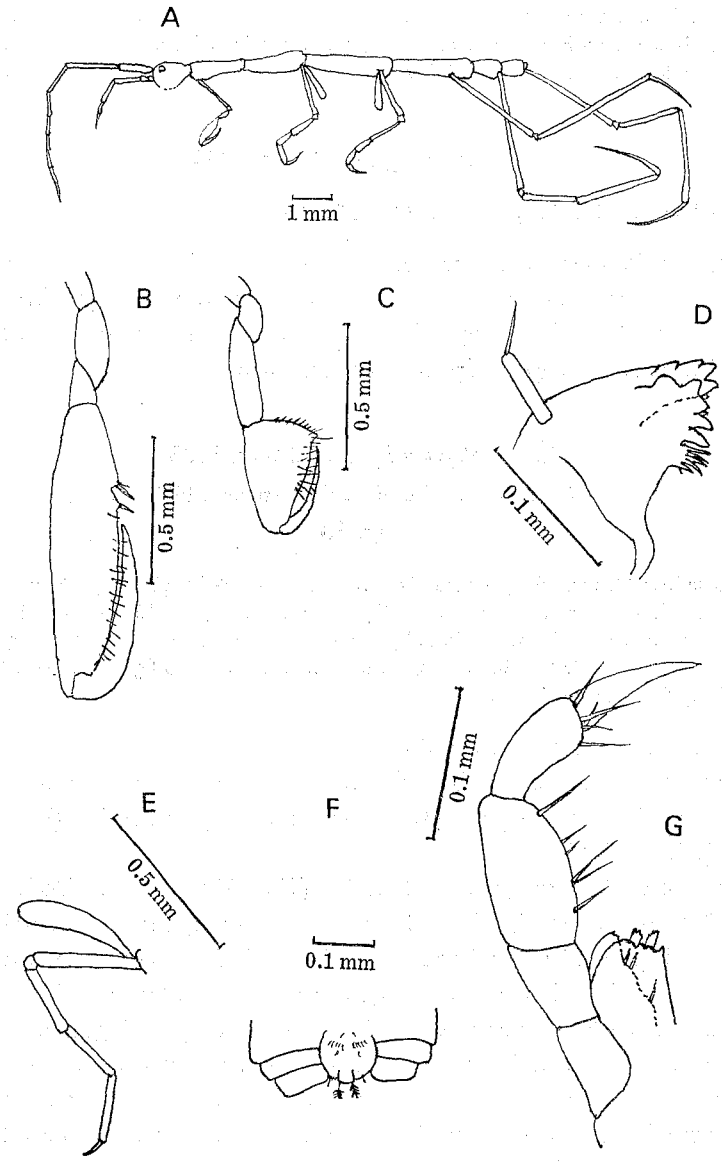

Fig. 10. *Protogeton inflatus* Mayer.
A, male; B, gnathopod 2; C, gnathopod 1 (A-C, after Utinomi); D, mandible; E, pereopod 4; F, abdomen of young male; G, maxilliped (D-G, after Mayer).

in length; three posterior pereopods quite alike, all being very slender, long and with falciform distal segment, pereopod 7 a little shorter than body length; distal segment of pereopod 5 somewhat shorter than that of pereopods 6–7; gills long, attached to pereonites III and IV; abdominal appendages of male and female absent.

DISTRIBUTION: Type locality: Dongala, Celebes, depth 34 meters.

Other locality around Japan: Tanabe Bay (Hiro, 1937: 310).

REMARKS: According to Mayer, "Bein 3 des ♂ sehr auffällig durch die Form der 3 letzten Glieder, indem nämlich der Beugerand zu dicken kesen aufgesohwollen ist. Diese eigentümliche, bei den Caprelliden noch nicht beobachtete Erscheinung ist offenbar normal, denu sie ist auch bei kleineren ♂ vorhanden, obwohl weniger auffällig; und sie ist um so merkwürdiger, als die Grosse Greifhand kein solches kissen hat." Present specimen has a similar structure in pereopods 3–4 as in other caprellids. Thus, Utinomi inclined to consider that the features shown by Mayer's example seem to be pathological and of no systematic significance.

Genus *Protomima* Mayer, 1903

Protomima Mayer, 1903, Siboga Exped. Mon., 34: 22.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 4-segmented; pereopods 3 and 4, 6-segmented, pereopod 5, 5-segmented; gills on pereonites II, III and IV; mandibular palp 3-segmented; abdomen of male with 2 pairs of biarticulate appendages, female's abdominal appendages with 2 pairs of uniarticulate appendages.

TYPE SPECIES: *Protomima denticulata* Mayer, 1903.

3. *Protomima imitatrix* Mayer, 1903

(Jap. name: *Mukasi-warekara* Utinomi)

Figs. 11, 12.

Protomima imitatrix Mayer, 1903, Siboga Exped. Mon., 34: 22, pl. 6 figs. 10–11, pl. 9 fig. 56.——Arimoto, 1929, Journ. Tokyo nat. Hist. Soc., 27 (38): 120–121, pl. 1.——Utinomi, 1947, Seibutsu, (suppl.) 1: 69.——Utinomi, 1968, Publ. Seto mar. biol. Lab., 16 (4): 282–284, figs. 1–2.——Bieri and Tokioka, 1968, Publ. Seto mar. biol. Lab., 15 (5): 387.——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 13.——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (5): 25–27, fig. 2.——McCain, Curst. Catal. 2, Caprellidea, 1: 71.

OCCURRENCE: Tateyama Bay, collected by Asajiro Oka, Apr. 28, 1895, 13 males, 2 females, Coll. no. 7; Yodo, Sagami Bay, collected by Asajiro Oka, Nov. 11, 1919, 1 male, attached to *Sargassum*, Coll. no. 84.

DESCRIPTION: Male: Body length of specimen 14 mm (Text-fig. 11); long and smooth, head coalesced with pereonite I, eye big and rounded, pereonite V

longer than any other segment, pereonite IV a little shorter than V, VI a little shorter than IV, III a little shorter than VI, II a little shorter than III, and VII the shortest of all segments.

Antenna 1 shorter than half of body length, its flagellum 7- or 8-segmented; antenna 2 shorter than peduncle of antenna 1, its flagellum 4-segmented; and setae absent; mandibular palp 3-segmented, setal formual of terminal segment of palp 1–7–1; outer lobe of maxilliped as long as inner lobe; gnathopod 2 located to front part of pereonite II, its segment 1 subequal in length to pereonite II, propodus as long as its segment 1, poison tooth small, and situated at front part, distal angle of palm triangular, palmar spine and two subspines at base of palm.

Gills elongate, attached to pereonites II, III and IV.

Pereopods 3 and 4 well-developed and elongate, about twice as long as at-

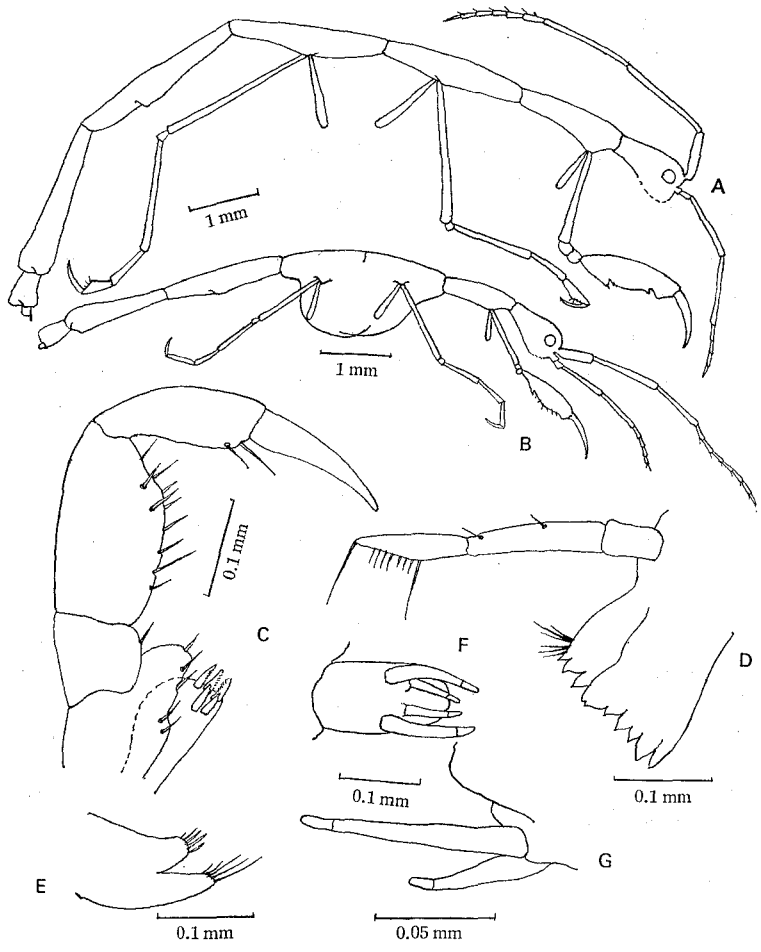

Fig. 11. *Protomima imitatrix* Mayer.
A, male; B, female; C, maxilliped; D, mandible; E, maxilla 2; F, abdomen of male; G, abdomen of female. (Arimoto, 1970).

tached pereonite, but each propodus has several palmar spines.

Abdomen with two pairs of large biarticulate appendages.

Female: Shape very like that of male, but there is no poison tooth on propodus of gnathopod 2. Abdominal appandages with 2 pairs of uniarticulate, elongate appendages.

DISTRIBUTION: Type locality: Enoura, Japan.

Other localities around Japan: Enoura (Mayer, 1903: 22); Tateyama Bay (Arimoto, 1929: 120); Hozaura; Gokasho Bay; Okinoshima, Fukuoka; Setozaki; Iki Strait (Utinomi, 1947: 69); Tanabe Bay (Utinomi, 1968: 282); Sagami Bay (Arimoto, 1970: 14).

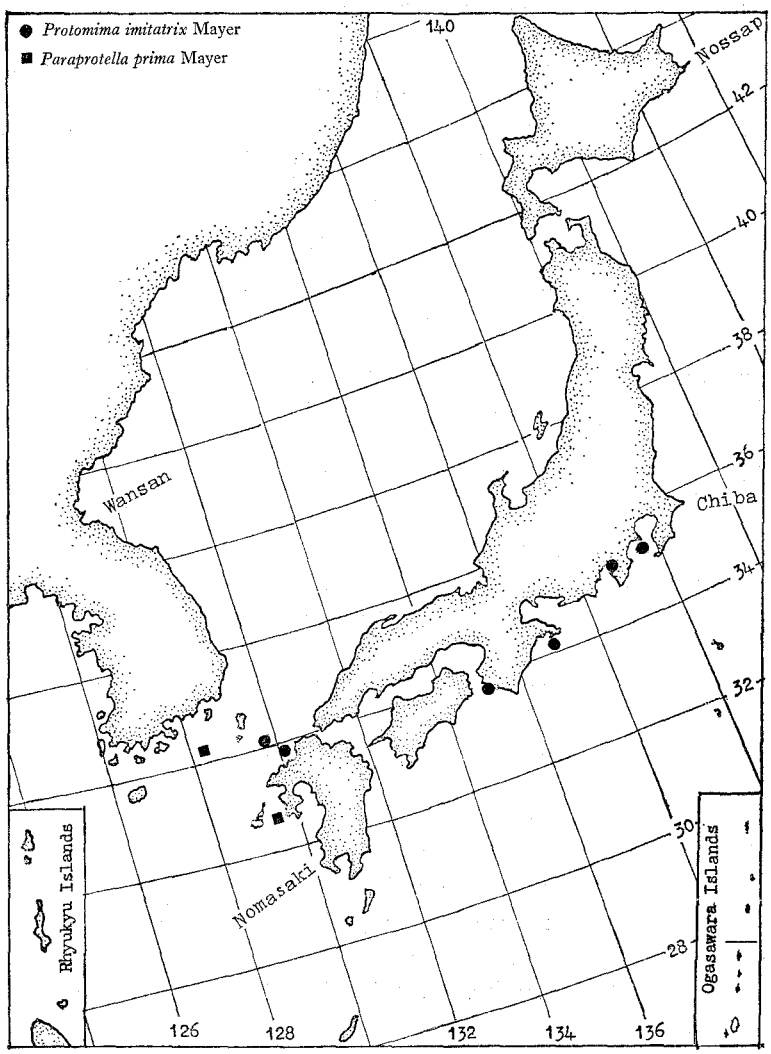

Fig. 12. Distribution records of *Protomima imitatrix* Mayer and *Paraprotella prima* Mayer around Japan.

4. *Protomima* sp. Mayer, 1903

Protomima sp. Mayer, 1903, Siboga Exped. Mon., 34: 22. ——Utinomi, 1947, Seibutsu, (suppl.), 1: 69. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 14.

No specimen in the author's collection.

OCCURRENCE: 33°5′ N., 128°22′ E., by Mayer.

REMARKS: This specimen was young, 7 mm in body length, having characteristic feature of mandibular palp with setal formula, 1–2–1, on segment 3.

Genus *Pseudoproto* Mayer, 1903

Pesudoproto Mayer, 1903, Siboga Exped. Mon., 34: 27.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2 biarticulate; pereopods 3 and 4, 6-segmented; pereopod 5, 5-segmented; gills on pereonites II, III and IV; mandibular palp 3-segmented; abdominal appendages absent in male.

TYPE SPECIES: *Pseudoproto fallax* Mayer, 1903.

5. *Pseudoproto fallax* Mayer, 1903

(Jap. name: *Chibihige-warekara* Arimoto, 1970)

Fig. 13.

Pseudoproto fallax Mayer, 1903, Siboga Exped. Mon., 34: 27–28, pl. 6 fig. 22, pl. 9 figs. 5, 52.—— Mayer, 1912, in Michaelsen and Hartmeyer, Fauna Südwest Austral., 4 (1): 8–9, fig. 3.——Utinomi, 1947, Seibutsu, (suppl.) 1: 69.——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 14.——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (5): 27–29, fig. 3.——McCain, 1960, Crust. Catal. 2, Caprellidea, 1: 75.

No specimen in the author's collection.

DESCRIPTION: With reference to Mayer's (1912: 8).

Male: Length of body 3 mm (Text-fig. 13), smooth; pereonites II, III, IV and VI subequal in length, pereonite V a little longer than those of above segments.

Antenna 1 shorter than about one-third of body length, but flagellum 4-segmented; antenna 2 a little shorter than antenna 1, and its flagellum 2-segmented and lacking swimming setae; mandibular palp with 3 segments, and setal formula of terminal segment, 4; gnathopod 2 attached to median of pereonite II, its basal segment rather shorter than the propodus, propodus, which is oval, the length more than twice as long as breadth, palmar spine and poison tooth absent; pereopods 3 and 4 slender, 6-segmented, pereopod 5, 5-segmented, and slender.

Gills oval, attached to pereonites II, III and IV.

Abdominal appendages, absent in male.

DISTRIBUTION: Type localities: 34°15′ N., 128°51′ E., 45.5 m; Koh Kauv and Koh Chuen, Thailand.

Other records: Sharks Bay, Western Australia.

Other locality around Japan: Korean Straits (Mayer, 1903: 27).

REMARKS: This species was first described by Mayer in 1903, from 1 young male 3 mm long, obtained from the Korean Straits in 1893. The specimen has smooth body and flagellum of antenna 1, 5-segmented, pereopods 5–7 were missing. Mayer described one more larva, 1 mm long, in 1912, this specimen has pereopod 5 with 5 segments.

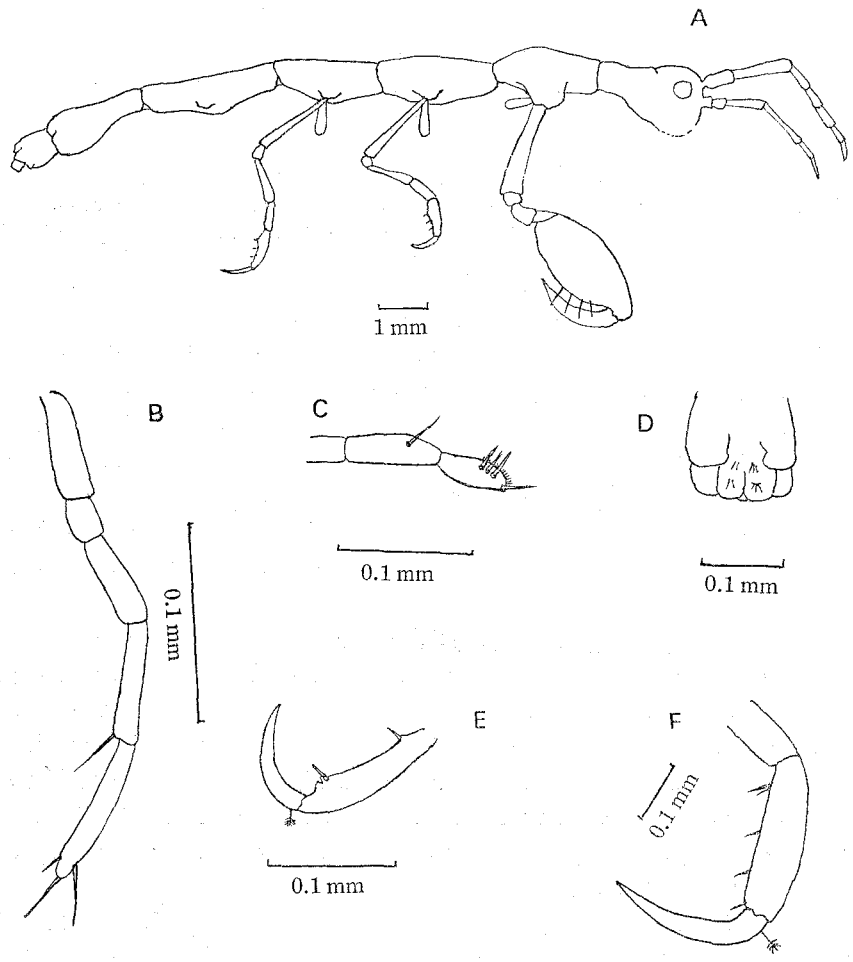

Fig. 13. *Pseudoproto fallax* Mayer (after Mayer).
A, male; B, pereopod 5, young; C, palp of mandible; D, abdomen of male; E, end part of pereopod 7; F, end part of pereopod 6.

Genus *Prellicana* Mayer, 1903

Prellicana Mayer, 1903, Siboga Exped. Mon., 34: 31.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; pereopods 3 and 4 absent, pereopod 5, 3- or 4-segmented; gills on pereonites III and IV; mandibular palp 3-segmented; abdominal appendages of male and female with

a pair of single-jonited appendages.

TYPE SPECIES: *Prellicana minima* Mayer, 1903.

REMARKS: Although Mayer stated in his original paper that pereopod 5 is 4-segmented, Utinomi (1968: 284) described his material having the pereopod 5, 3-segmented, but in fact the basal one is obscurely divided into 2 parts.

6. *Prellicana minima* Mayer, 1903

(Jap. name: *Ashinaga-tibi-warekara* Utinomi, 1968)

Fig. 14.

Prellicana minima Mayer, 1903, Siboga Exped. Mon., 34: 31, pl. 1 figs. 16–17, pl. 6 figs. 35–37, pl. 9 figs. 13, 32, 53. ——Utinomi, 1968, Publ. Seto mar. biol. Lab., 16 (4): 284–285, fig. 3. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 15. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 68.

No specimen in the author's collection.

DESCRIPTION: With reference to Mayer's description.

Male: Length of specimen, in Mayer's figure, 2 mm; body slender, smooth without spines; pereonite V longer than any other segment, pereonite VI a little shorter than V, III a little shorter than VI, and as long as IV, II a little shorter than head, VII a little shorter than II, head moderately large, fused with shorter pereonite I by slight oblique suture; eyes rather large.

Antenna 1 a little longer than pereonite I and II taken together, flagellum 3-segmented; antenna 2 slightly shorter than antenna 1, apparently lacking sensory setules.

Mandibular palp 3-segmented, setal formula of terminal segment of palp, 1–1–0; trunk small, incisor with 5 or 6 tooth, lacinia divided into about 5 teeth; inner lobe of maxilliped as long as outer lobe, and with two large teeth apically, outer lobe with several spines on apical margin, 4th segment of palp not so sharp.

Gnathopod 2 attached to center of pereonite II, propodus more than twice as long as broad, more or less oblong, palm evenly curved, with proximal projection, and with grasping palmar spines and subspine; gnathopod 1 like gnathopod 2 in shape but slightly smaller.

Pereopods 3 and 4 without, pereopod 5 rudimentary, only about 0.2 mm long, and apparently 4-segmented, its 2nd segment in fact obscurely divided into 2 parts, pereopod 6 and 7 missing.

Gills on pereonites III and IV, very small.

Abdomen with a pair of one-jointed appendages.

Female: Reproduced from Mayer's description (1903: 31). Length of specimen, in Mayer's figure, 2.3 mm; pereonites III and IV a little longer than half of pereonite V; flagellum of antenna 1, 2-segmented.

Pereopods 6 and 7 very long and slender and subequal in length and shape, segment 4 long and with several setae, propodus longer than segment 4, elongate with several spines, and lacking grasping spines, dactylus very elongate.

Abdomen with a pair of one-jointed appendages.

DISTRIBUTION: Type localities: Koh Kauv and Koh Chuen, Thailand, 18.3–27.4 meters.

Other locality around Japan: Seto-zaki, south of Tanabe Bay (1 male, 1.2 km south of Seto-zaki, 50 m depth, 1966, Utinomi, 1968: 284).

REMARKS: Mayer's specimens including 2 males and many females, collected by Mortensen in 1890, were about 2 mm in body length, but Utinomi's material was one male, 1.6 mm in body length, collected by T. Tokioka in 1966. Flagellum of antenna 1 of Mayer's specimens was 3-segmented in male and 2-segmented in female, but Utinomi's male was 5-segmented; pereopod 5 rudimentary, apparently 4-segmented in Mayer's material, instead of 3-segmented as in Utinomi's specimen.

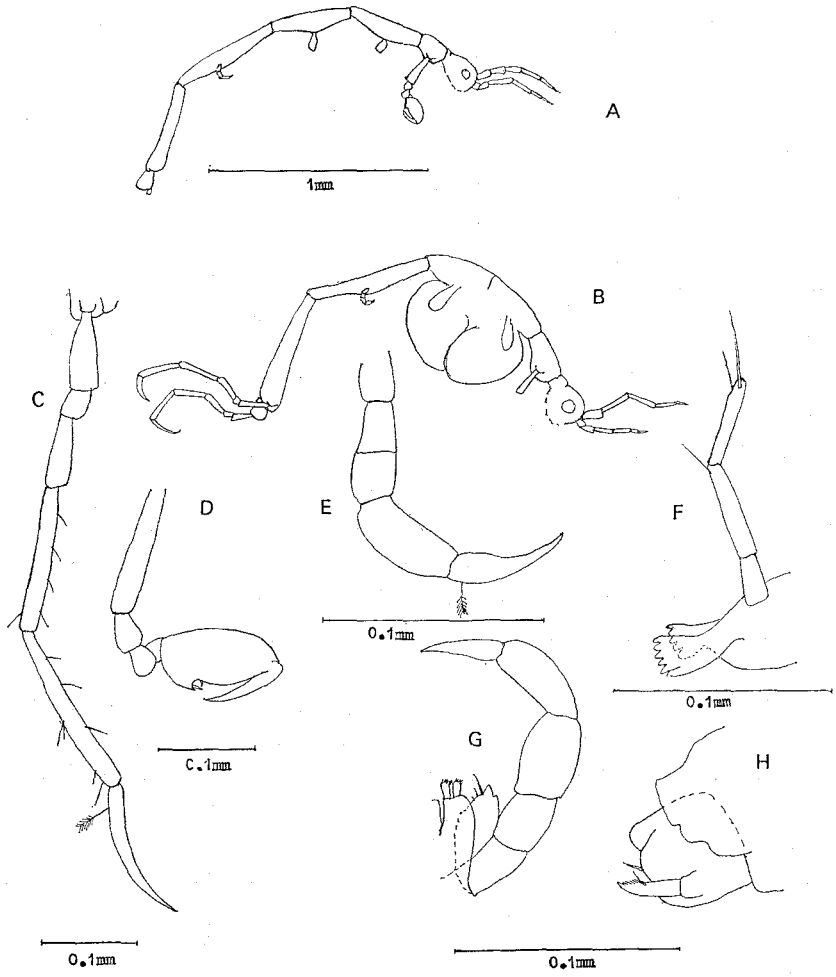

Fig. 14. *Prellicana minima* Mayer (after Mayer).
A, male; B, female; C, pereopod 7; D, gnathopod 2 of male; E, pereopod 5 of male; F, mandible of male; G, maxilliped of male; H, abdomen of male.

Utinomi (1968: 285) stated that "at first I was inclined to assign it to either the genera *Caprellinoides* Stebbing (1883) or *Parvipalpus* Mayer (1890), but later noticed that it agreed with *Prellicana minima* Mayer (1903) reported only from Koh Kauv, 10 fathoms, and Koh Chuen, 15 fathoms (both the Gulf of Thailand). If this tentative identification proves to be correct, this may be the second occurrence outside of the type locality."

Genus *Triperopus* Mayer, 1903

Triperopus Mayer, 1903, Siboga Exped. Mon., 34: 56.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; pereopods 3, 4 and 5, 3-segmented; gills on pereonites III and IV; mandibular palp 3-segmented; abdominal appendages absent in female.

TYPE SPECIES: *Triperopus mirus* Mayer, 1903.

7. *Triperopus mirus* Mayer, 1903

(Jap. name: *Kawari-warekara* Arimoto, 1971)

Fig. 15.

Triperopus mirus Mayer, 1903, Siboga Exped. Mon., 34: 56, pl. 2 fig. 31, pl. 7 figs. 27–32, pl. 9 figs. 22, 41, ——Utinomi, 1947, Seibutsu (suppl.), 1: 70. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 14. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 76. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (6): 44 fig. 9.

No specimen in the author's collection.

OCCURRENCE: Collected by Schohnau Mai in 1888, 32°10′ N., 128°20′ E., Mayer, 1903: 56.

DESCRIPTION: With reference to Mayer's (1903: 56).

Female: Length of body 6 mm (Text-fig. 15); body smooth, head smoothly rounded above; pereonite V the longest of all, II, III and IV about equal in length, and nearly half as long as pereonite V, pereonites VI and VII taken together shorter than II.

Antenna 1 shorter than half of body length, flagellum 12-segmented; antenna 2 shorter than peduncle of antenna 1, its flagellum composed of 2 segments, swimming setae absent; mandibular palp has 3 segments, setal formula of terminal segment 1–3–9–1; inner lobe of maxilliped very small and scarcely extends beyond base of 1st segment of palp with several apical spines, outer lobe large and reaching middle of segment 2 of palp, with several spines. Gnathopod 2 attached to the front part of pereonite II, its segment 1 about as long as propodus, propodus large, more or less oval and more than twice as long as broad, poison tooth small, situated at middle part of palm, with 2 spines on proximal projection at base of palm. Pereopods 3, 4 and 5 with 3 segments and few setae, pereopods 6 and 7 with 6 segments, palms of propodus of each pereopod with a proximal pair of grasping spines, palmar sur-

face with several projections having grasping spines.

DISTRIBUTION: Type locality: Korean Straits (32° 10′ N., 128°20′ E.), 182.9 meters.

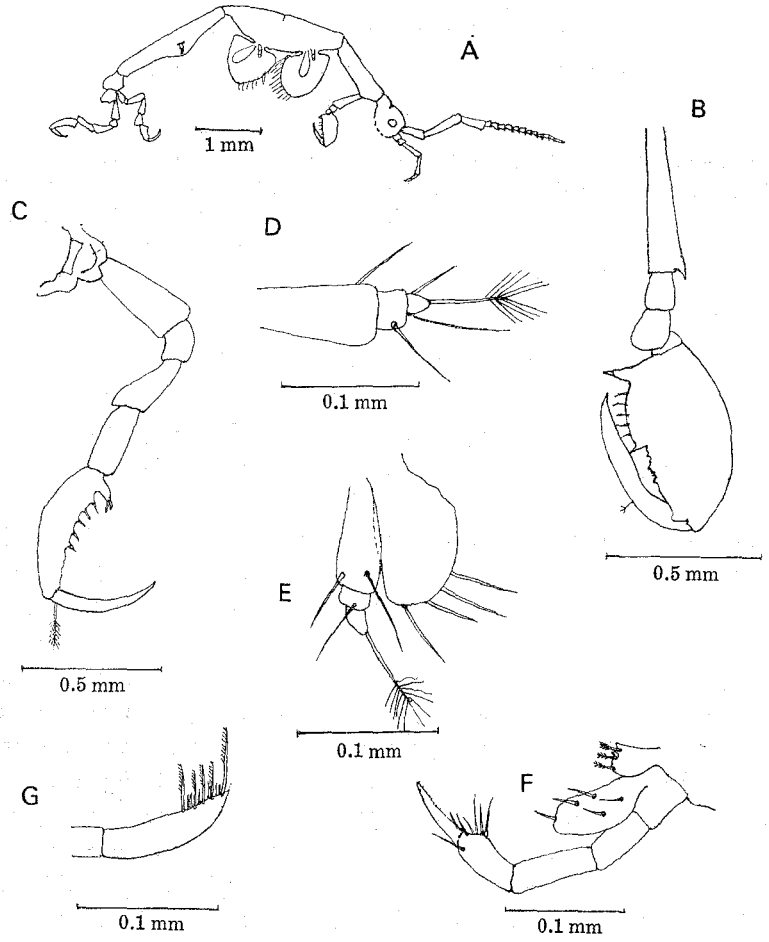

Fig. 15. *Triperopus mirus* Mayer (after Mayer).
A, female; B, gnathopod 2; C, pereopod 7; D, pereopod 5; E, pereopod 4; F, maxilliped; G, palp of mandible.

Genus *Paraprotella* Mayer, 1903

Paraprotella Mayer, 1903, Siboga Exped. Mon., 34: 38.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2 with 2 segments; pereopods 3–4, 3-segmented, pereopod 5, 6-segmented; gills on pereonites III and IV; mandibular palp, 3-segmented; abdomen of male and female with a pair of appendages and a pair of lobes.

TYPE SPECIES: *Paraprotella prima* Mayer, 1903.

Key to species of *Paraprotella* around Japan.

1. Lateral spine on pereonite VI as small tubercles ..... *prima*
2. Lateral spine on pereonite VI as large projections ..... *secunda*

8. *Paraprotella prima* Mayer, 1903

(Jap. name: *Mifusieraasi-warekara* Utinomi, 1964)

Figs. 12, 16.

Paraprotella prima Mayer, 1903, Siboga Exped. Mon., 34: 38–39, pl. 1 figs. 27–29, pl. 6 figs. 50–55, pl. 9 figs. 10, 34, 64–65. ——Utinomi, 1947, Seibutsu (suppl.), 1: 69. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 14. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 60. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (6): 39, figs. 6–7.

No specimen in the author's collection.

DESCRIPTION: With refernce to Mayer's (1903: 38).

Male: Length of specimen, in Mayer's figure, 6 mm; body not smooth, head with several acute frontal spines; pereonite V longer than any other pereonite, III and IV both a little shorter than V, II a little shorter than III and about as long as VI; pereonite I with a tubercle on back, pereonite II with a tubercle on rear end of back, and a pair of acute spines on center of back, pereonites III and IV each with a lateral tubercle on forepart of each side. Antenna 1 longer than half of body length, its flagellum 15-segmented; antenna 2 longer than peduncle of antenna 1, its flagellum 2-segmented, swimming setae absent. Mandibular palp 3-segmented, setal formula of terminal segment 1-x-y-1; inner lobe of maxilliped very small and scarcely extending beyond base of 1st segment of palp and with 4 apical spines, outer lobe very much larger than inner, with 2 spines at inner margin apically. Propodus of gnathopod 2 (Mayer, 1903, pl. 6, fig. 53, male) large, more or less oval, twice as long as broad, poison tooth large and strong, located submedially, distal angle of palm triangular and strong, at base of palm with a grasping spine; pereopods 3 and 4, 3-segmented, and free margin fringed with setae, pereopod 5, 6-segmented, elongate and smaller than pereopods 6 and 7, its propodus feeble; gills oval, attached to pereonites III and IV. Abdomen of male with a pair of appendages and a pair of lobes.

Female: Body 10 mm long (Mayer's specimen; 1903, pl. 1, fig. 28); shape of female nearly like that of male; pereonite II with two dorsal spines at center and a tooth at rear end, these spines larger than those in male, pereonites III and IV each with a pair of small tubercles on the back; abdomen with a pair of appendages and a pair of lobes.

DISTRIBUTION: Type localities: Singapore, 9.1–10.9 meters, Malaysia; 34° 15′ N., 128°15′ E., Korea, 45.5 meters; between Koh Mesan and Kap Liant, Thailand, 9.1–14.56 meters.

Other localities around Japan: Nagasaki (Mayer, 1903: 38); Korean Straits (Mayer, 1903: 38).

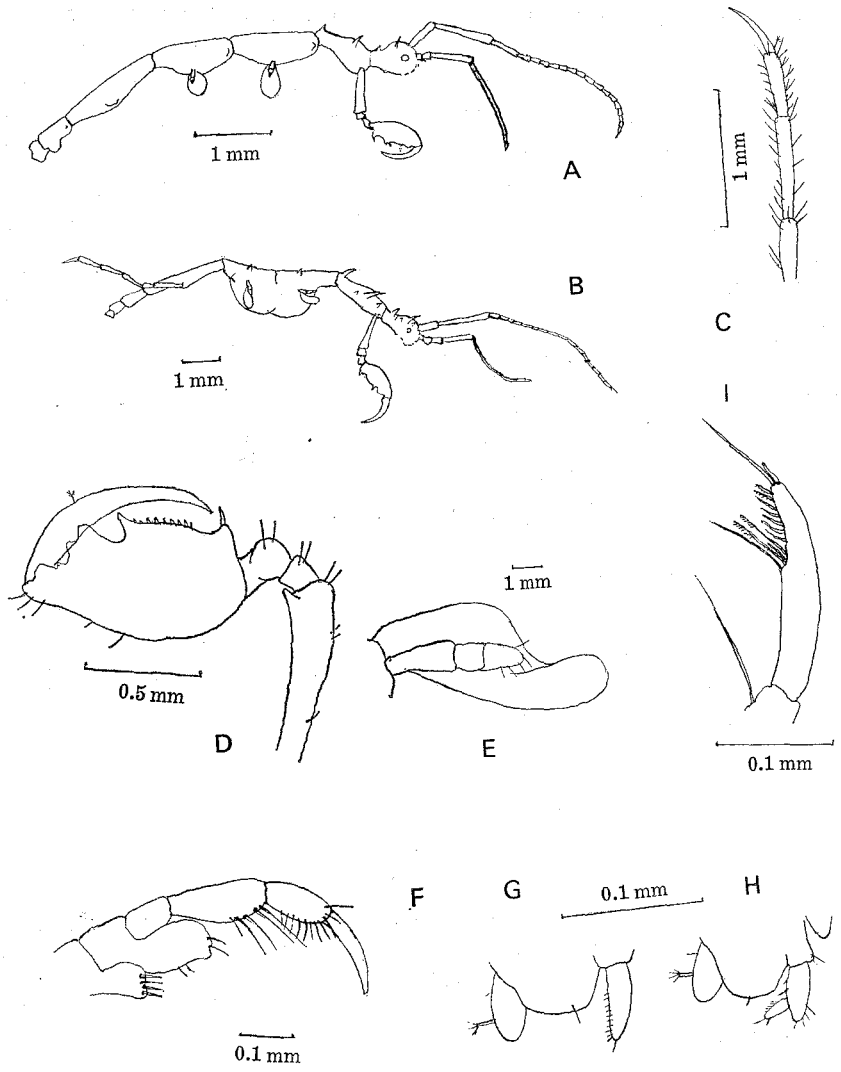

Fig. 16. *Paraprotella prima* Mayer (after Mayer).
A, male; B; female; C, pereopod 3; D, gnathopod 2 of male; E, gill and pereopod 3 of female; F, maxilliped; G, abdomen of female; H, abdomen of male; I, terminal segment of mandibular palp.

9. *Paraprotella secunda* Mayer, 1903

(Jap. name: *Dainimifushieraashi-warekara* Arimoto, 1970)

Paraprotella secunda Mayer, 1903, Siboga Exped. Mon., 34: 71. ——Utinomi, 1947, Seibutsu (suppl.), 1: 69. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 14. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 60. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (6): 41.

No specimen in the author's collection.

DESCRIPTION: With reference to Mayer's (1903: 71).

Male: Mayer's young specimen (Mayer, 1903: 71) 7 mm in body length; pereonites I and II bearing a spine on back, but that on pereonite I very small, pereonite III with a pair of dorsal spines at median part, and a tooth at distal end, no lateral spines on pereonites III and IV, but VI with very large lateral spines; segment 1 of pereopods 3 and 4 a little shorter than *prima*; flagellum of antenna 1, 20-segmented; gnathopod 2 like male's in shape, propodus of gnathopod 2, long and poor in young male, palmar spine of gnathopod 2, located at base and small, poison spine distally, palmar margin with several spines.

Female: Body length of young female, 8 mm, in Mayer's material, with shape very like that of male.

DISTRIBUTION: Type locality: Off Tokyo, 96.9 meters.

REMARKS: Mayer did not give any picture of this species.

Genus *Aciconula* Mayer, 1903

Aciconula Mayer, 1903, Siboga Exped. Mon., 34: 43.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; pereopods 3–4, 2-segmented, pereopod 5 abnormal for caprellids, being long, soft and flexible, and 6-segmented; gills on pereonites III and IV; mandibular palp 3-segmented; abdominal appeandages of female with a pair of simple lobes.

TYPE SPECIES: *Aciconula miranda* Mayer, 1903.

10. *Aciconula miranda* Mayer, 1903

(Jap. name: *Higeasi-warekara* Utinomi, 1969)

Fig. 17.

Aciconula miranda Mayer, 1903, Siboga Exped. Mon., 34: 43–44, pl. 6 figs. 64–67, pl. 9 figs. 8, 33, pl. 10 fig. 10. ——Mayer, 1912, in Michaelsen and Hartmeyer, Fauna Südwest-Austr., 4 (1): 10–11, fig. 4. ——Utinomi, 1969, Publ. Seto mar. biol. Lab., 16 (5): 296–297, fig. 1. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 13. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 5.——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (6): 42, fig. 8.

No specimen in the author's collection.

OCCURRENCE: Collection by H. Utinomi, in 1965, 1 female, Sunohama, Yakatasima, depth 3 meters.

DESCRIPTION: Male: With reference to Mayer's description, 1912: 10, Sharks Bay, 12.5 m. Median part of back of pereonite II armed with a projection only; pereopods 3, 4 and 5 very like those of female.

Female: With reference to Utinomi's description, 1969: 296. Body length 3 mm, head and body smooth; pereonite V longer than other pereonites, pereonites II, III and IV about equal in length, and shorter than V, pereonites VI and VII much shorter than preceding pereonites.

Antenna 1 apporximately half of body length, its flagellum 4-segmented, antenna 2 approximately as long as peduncle of antenna 1, flagellum 2-segmented and

shorter than segment 2 of peduncle, both weakly setose as in antenna 1; mandibular palp with 3 segments, and setal formula of terminal segment 1–7–1; inner lobe of maxilliped very small and with several apical spines, outer lobe very long and extending a little beyond that of 2nd segment of palp, 4th segment of palp sharp; gnathopod 1 small, propodus triangular, quite setose with 2 proximal grasping spines; gnathopod 2 well-developed, attached to triangular projection on fore end of pereonite II, basal segment long, smooth, propodus roughly oval with 2 grasping spines on proximal projection, palmar margin slightly convex and indented and

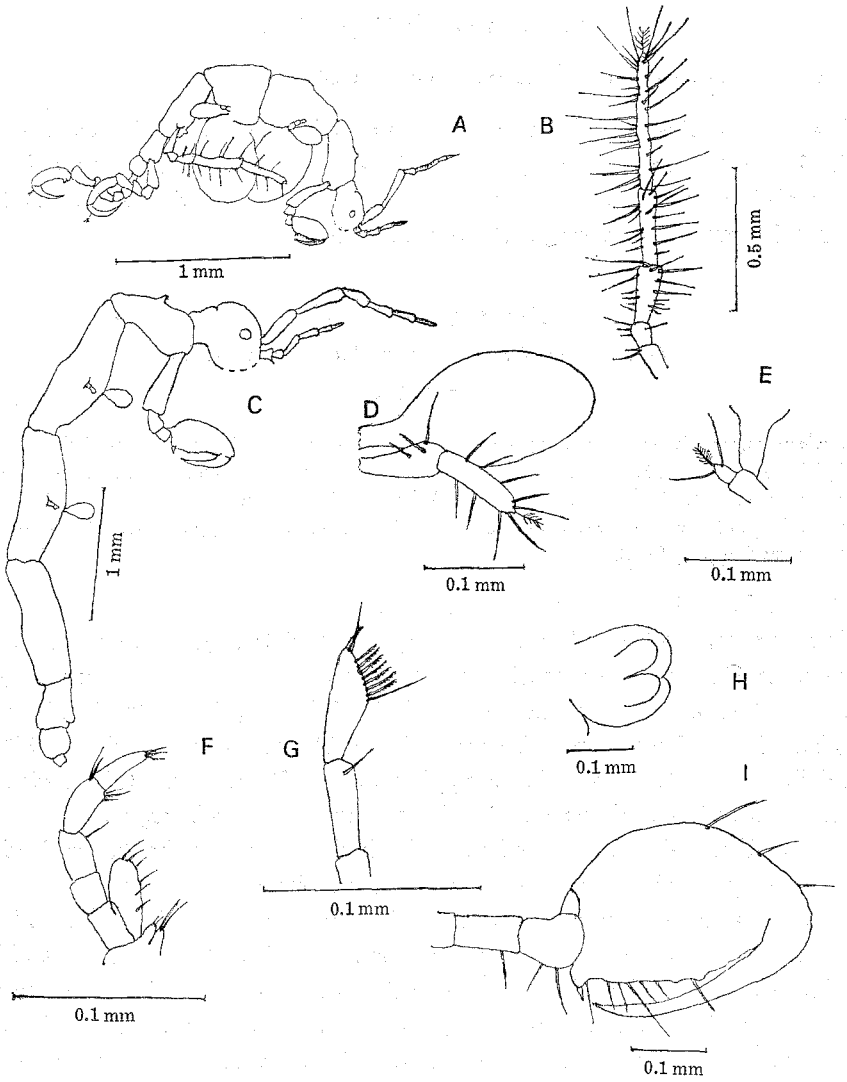

Fig. 17. *Aciconula miranda* Mayer.
A, female; B, pereopod 5; C, male; D, pereopod 3; E, pereopod 4; F, maxilliped; G, palp of mandible; H, abdomen of female; I, propodus of gnathopod 2; (A-B, D-G, after Mayer, 1903; C, after Mayer, 1912). (H, I, after Utinomi, 1968).

strongly setose, dactylus broad with its inner margin evenly concave and not serrate, pereopods 3 and 4 rudimentary, but clearly 2-segmented; pereopod 5 abnormal for caprellids, being long, soft and flexible, distal 4 and 5 segments conspicuously hairy.

DISTRIBUTION: Type localities: Singapore, 9.6–10.9 meters; Malaysia and Koh Krau, Thailand, 54.6 meters.

Other records: Sharks Bay, Australia.

Other locality around Japan: Sunohana, Yakatajima in Kamae Bay, 1965 (Utinomi, 1969: 296–297).

Genus *Noculacia* Mayer, 1903

Noculacia Mayer, 1903, Siboga Exped. Mon., 34: 50.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; pereopods 3 and 4, 2-segmented, pereopod 5, 6-segmented; mandibular palp 3-segmented; abdominal appendages of both male and female with a pair of lobes.

TYPE SPECIES: *Noculacia bullata* Mayer, 1903.

11. *Noculacia bogisa* Mayer, 1903

(Jap. name: *Senakafutatoge-warekara* Arimoto, 1970)

Fig. 18.

Noculacia bogisa Mayer, 1903, Siboga Exped. Mon., 34: 52–53. pl 2 fig. 16, pl. 7 figs. 7–8, pl. 9 figs. 19, 39, 66, pl. 10 fig. 3. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 15. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 57. ——Arimoto. 1971, Biogeogr. Soc. Japan, 27 (8): 63.

Noculacia sp. Mayer, 1903, Siboga Exped. Mon., 34: 53, pl. 2 fig. 22, pl. 7 figs. 9–12. ——Utinomi, 1947, Seibutsu (suppl.), 1: 69.

No specimen in the author's collection.

DESCRIPTION: With reference to Mayer's (1903: 52): "Ebenfalls in den ostasiatischen Gewässern, aber viel nördlicher, ist gefischt worden ein junges ♀, etwa 4.5 mm lang, Geissel der Vorderfühler mit 10 Gliedern, Stacheln ähnlich wie bei *N. bogisa*. Im Uebrigen verweise ich auf die Abbildungen; Fundort: 32°2′ N., 128°45′ E., 105 Faden, leg. Duensen, Dec. 5, 1898." Utinomi (1947: 69), however, stated that it could perhaps be the young of *Noculacia bogisa*.

Young female 4.5 mm in body length; body spinose on back, head with one acute frontal spine without any other spines; pereonite V the longest of all segments, pereonite III a little shorter than V, IV a little shorter than III, VI and VII taken together shorter than IV, II a little longer than head, I a little shorter than II; rear part of pereonite I and II with a large dorsal tubercle, and middle part of pereonite II with a pair of acute dorsal tubercles, pereonites II, III and IV each with a large spiny lateral tubercle on forepart on each side, like in adult. Antenna 1 longer than half of body length; antenna 2 a little shorter than peduncle of antenna 1, flagellum, 2-segmented, and lacking swimming setae.

Propodus of gnathopod 2 more or less oval and more than twice as long as

broad, palmar spine small, at base of palm; pereopods 3 and 4, 2-segmented at base of gills, free margin fringed with setae.

DISTRIBUTION: Type localities: Pulu Jedan, Arafura Sea, 13 meters, and Koh Krau, Thailand, 54.6 meters.

Other localitiy in Japan and adjacent waters: The Korean Straits (Mayer, 1903: 53).

REMARKS: Mayer's specimen (1903, pl. 2, fig. 16) is adult, measuring 9 mm, and bearing one acute spine on head; pereonites I and II each with one dorsal spine at distal end, pereonites II, III and IV each with a large lateral tubercle in forepart on each side; mandibular palp with 3 segments and setal formula of terminal segment 1-X-1; propodus of ganthopod 2 large and its poison tooth strong, situated near triangular distal projection; pereopods 3 and 4, 2-segmented, at base of gills.

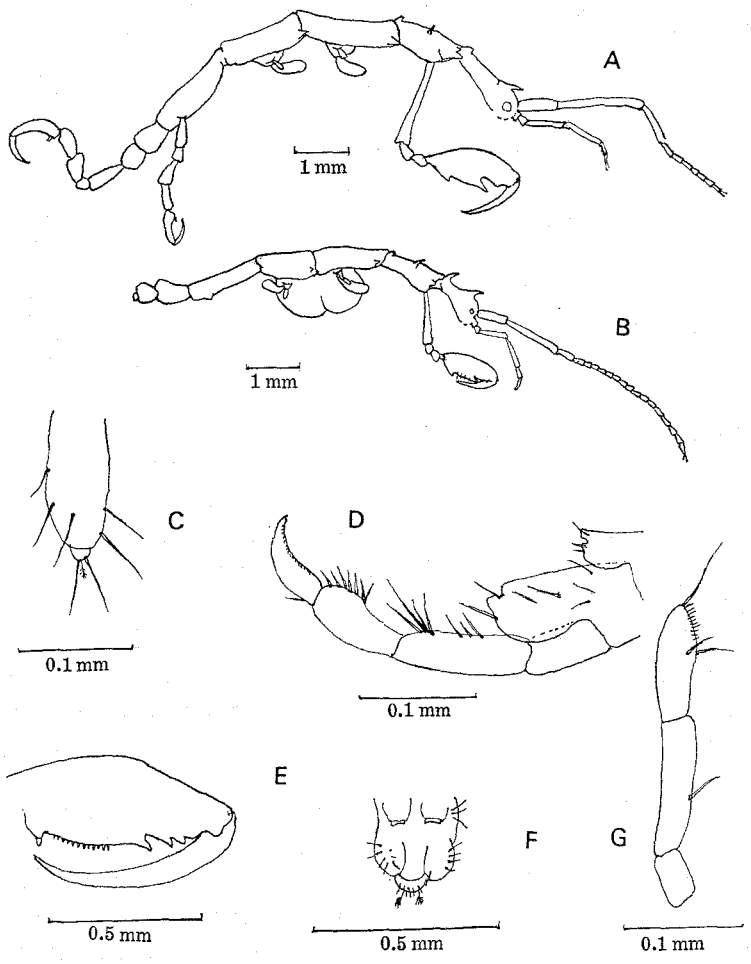

Fig. 18. *Noculasia bogisa* Mayer (after Mayer).
A, male; B, female; C, pereopod 4; D, maxilliped; E, propodus of gnathopod 2 of female; F, abdomen of male; G, palp of mandible of male.

Genus *Monoliropus* Mayer, 1903

Monoliropus Mayer, 1903, Siboga Exped. Mon., 34: 53.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; pereopods 3 and 4, single segmented, pereopod 5, 6-segmented; gills on pereonites III and IV; mandibular palp 3-segmented; abdominal appendages of male with a pair of biarticulate appendages and a pair of lobes, female with a pair of lobes.

TYPE SPECIES: *Monoliropus agilis* Mayer, 1903.

12. *Monoliropus tener* Arimoto, 1968

(Jap. name: *Yasashinote-warekara* Arimoto, 1970)

Fig. 19.

Monoliropus tener Arimoto, 1968, Bull. Biogeogr. Soc. Japan, 24 (8): 59–61, fig. 1. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 15. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 56.

OCCURRENCE: Tateyama Bay, collected by Eiji Uchida, June 15, 1930, several males and females, Coll. no. 506.

DESCRIPTION: Male holotype: Length of body 13.0 mm, 1st antenna 4.5 mm, 2nd antenna 3.2 mm, 5-7th pereopods 3.5 mm, 3.7 mm and 4.0 mm, respectively.

Body long and slender, pereonites III and V subequal in length, and longer than other pereonite, IV a little shorter than III, II a little shorter than IV, I a little shorter than II, VI and VII taken together a little shorter than II; head has a gentle rise in the middle part of upper side, smooth; pereonites I and III to VII smooth, pereonite II with 3 pairs of dorsal spines and one or two lateral spines near gnathopods.

Antenna 1 one-third of body length, its flagellum with 10–11 segments, and peduncle a little longer than flagellum; antenna 2 longer than peduncle of antenna 1, slender and finely setose, with 2-segmented flagellum.

Mandibular palp with 3 segments, setal formula of terminal segment of palp 1–4–1, incisor of mandible divided into 5 teeth, lacinia mobilis 3-toothed, molar tubercle wide.

Gnathopod 2 attached near the middle part of pereonite II, its length subequal to that of pereonites II and III together, 1st segment a little shorter than pereonite II, propodus a little longer than 1st segment, becoming narrow at base and widened and curved to rear end, plumose setae on palm, poison spine near a triangular process distally.

Pereopods 3 and 4 degenerated to 1-jointed lobe only, tipped with several setae, pereopods 5, 6 and 7 slender, nearly of the same length and 6-segmented, propodus of pereopod 5 without palmar spine, while pereopods 6 and 7 with palmar spines.

Gills elongated oval-shaped, longer than half length of pereonite III or IV.

Abdomen with a pair of abdominal appendages consisted of 2 segments, having setae at tip, and a pair of lobes; penes separated.

Female allotype: Body 8 mm in length, smooth, gnathopod 2 smaller than

that of male, and attached to foreend of pereonite II.

DISTRIBUTION: Type locality: Tateyama Bay.

TYPE SPECIMEN: Figured herein, No. 506.

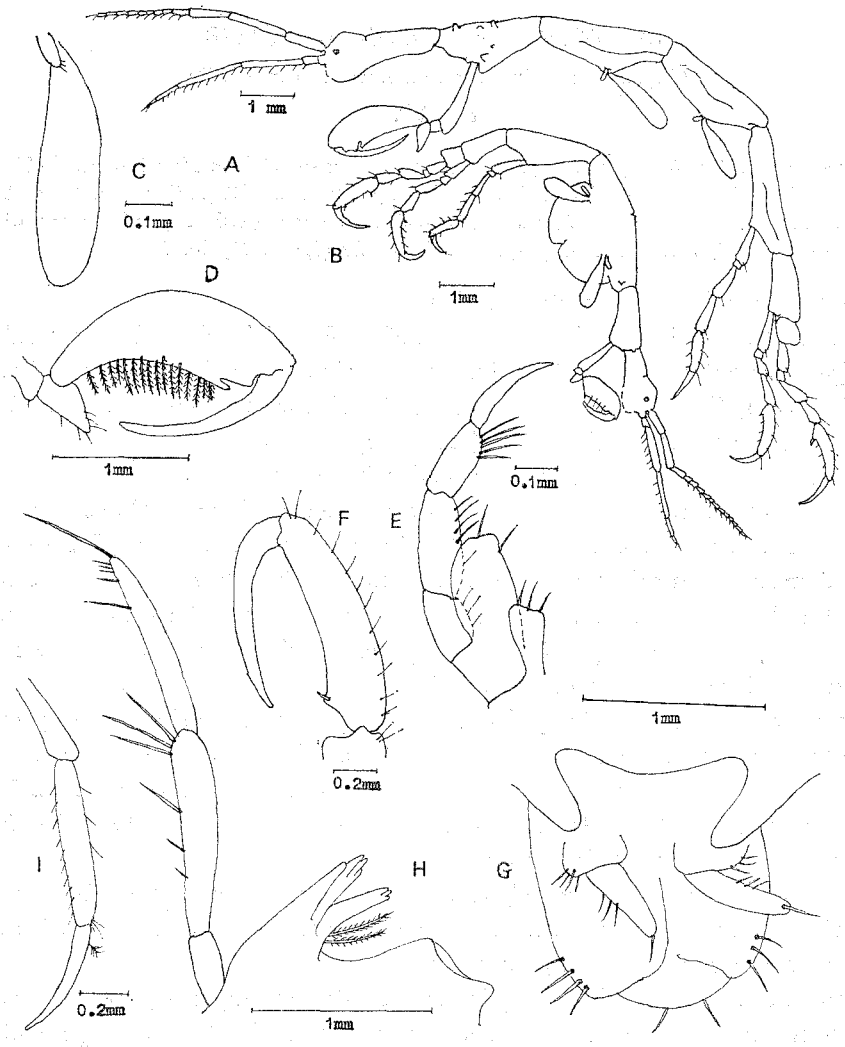

Fig. 19. *Monoliropus tener* Arimoto.
A, male; B, female; C, pereopod 3 and gill; D, propodus of gnathopod 2 of male; E, maxilliped; F, propodus of pereopod 7; G, abdomen of male; H, mandible; I, pereopod 5. (Arimoto, 1968).

Genus *Metaprotella* Mayer, 1890

Metaprotella Mayer, 1890, Fauna Flora Golf. Neapel, 17: 24.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; pereopods 3 and 4, 1-segmented, pereopod 5 normal; gills on pereonites III and IV;

mandibular palp 3-segmented; abdomen of male with a pair of appendages, female with a pair of lobes.

TYPE SPECIES: *Metaprotella haswelliana* (Mayer, 1882)

13. *Metaprotella sandalensis* Mayer, 1898

(Jap. name: *Hitohusi-eraasi-warekara* Utinomi, 1973)

Fig. 20.

Metaprotella sandalensis Mayer, 1898, Zoo. res. based on material from New Britain: 53–56, fig 6. ——Mayer, 1903, Siboga Exped. Mon., 34: 40, pl. 1 figs. 30, 31, 34–36, pl. 6 figs. 56–63, pl. 9 figs. 16, 17, 44 and 60. ——Mayer, 1912, Fau. Südwest-Australiens: 9 (with a question mark, without figure). ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 28–31, fig. 1.

No specimen in the author's collection.

OCCURRENCE: 5 males (SMBL-Rare, 269). Found in stomach of a pufferfish *Acanthigaster rivulatus* Temminck et Schlegel, obtained near Isle Engetsutō, Bansyo-zaki, Sirahama, Wakayama Pref., X, 23, 72, T. Kuwamura coll. (Utinomi: 1973).

DESCRIPTION: After Utinomi's (1973: 28).

Male body 13 mm long, slender and spinose on dorsum.

Head rounded with a pair of anteriorly directed small spines above eyes. Pereonite I smooth, shorter and narrower than head. Pereonites II and III each with a pair of strong anteriorly directed spines medially and a strong anteriorly directed posterodorsal spine. The former shorter than the latter. Pereonites IV and V smooth, elongate and subequal in length, approximately as long as III. Pereonites VI and VII fused, shorter than half of V.

Antenna 1 longer than body, flagellum 13-segmented, basal article of peduncle moderately swollen, distal 2 articles of peduncle much elongate, of subequal length, much more than basal one. Antenna 2 approximately as long as proximal 2 articles of peduncle of antenna 1; its basal article acutely ended anteroventrally; flagellum biarticulate, without swimming setae.

Mandibular palp 3-segmented, setal formula for terminal article 1–6–1; mandible with 3-toothed incisor, 5-toothed lacinia mobilis and setal row of 3 serrate setae. Others agree with Mayer's description.

Propodus of gnathopod 1 triangular with single grasping spine, grasping margins of dactylus and propodus serrate. Gnathopod 2 attached to fore end of pereonite II, propodus of elliptical with a proximal grasping spine and with a median triangular poison tooth, palm moderately setose; basis slightly shorter than pereonite II.

Gills oval instead of elongated form.

Pereopods 3 and 4 one-segmented, rudimentary, approximately one-fourth length of gills. Pereopods 5–7 developed, 6-segmented, moderately serrate, with a pair of proximal grasping spine.

DISTRIBUTION: Tropical West-Pacific and Indian Oceans, from Sandal Bay, 18.2–27.3 meters; Lifu, Loyalty Islands-Type locality (Mayer, 1898, 1903). Ralum, Singapore, Bay of Thailand, Ceylon (Mayer, 1903) and (?) Sharjs Bay, west

Australia (Mayer, 1912).

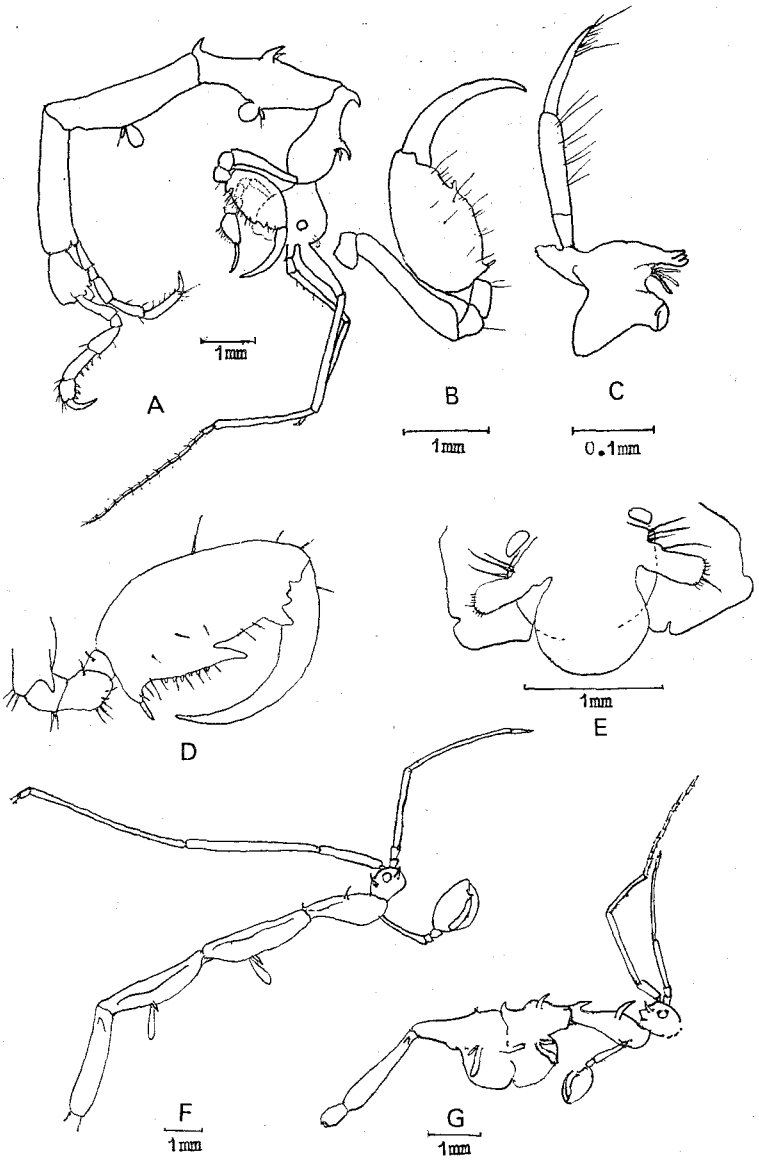

Fig. 20. *Metaprotella sandalensis* Mayer.
A, male; B, gnathopod 2 of male; C, mandible; (A-C, after Utinomi, 1973); D, gnathopod 2 of male; E, abdomen of male; F, male; G, female. (D-G after Mayer, 1903).

Genus *Protella* Dana, 1852

Protella Dana, 1852, Amer. Journ. Sci., (2) 14: 307.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; per-

eopods 3 and 4, 1-segmented, pereopod 5 normal; gills on pereonites III and IV; mandibular palp, 3-segmented; abdomen of male with a pair of appendages and a pair of lobes; female with a pair of lobes.

TYPE SPECIES: *Protella gracilis* Dana, 1853.

REMARKS: Sars (1895: 648) states that "This genus was established in year 1852 by Dana, and characterized by presence of distinct, though small rudiments of 2 anterior pairs of pereopods. This genus was also accepted by S. Bate (1862: 352), where-as Boeck (1870: 190) combined it with genus *Aegina* of Kröyer (1843: 496). In external appearances, both genera certainly closely related, but ougth, in my opinion, to be kept apart on account of above-mentioned characteristics, which were overlooked by Boeck, and also because urosome exhibits in both a rather different structure. Several species also of this genus have been discribed, some of which appear to well marked" (Sars. 1895: 10).

14. *Protella gracilis* Dana, 1853

(Jap. name: *Warekaramodoki* Utinomi, 1964)

Figs. 21, 22.

Protella gracilis Dana, 1853, United States Explor. Exped., 14 (2): 812–813. ——Dana, 1855, United States Explor. Exped., 13/14 (atlas): pl. 54 fig. 2. ——Bate, 1862, Catal. Amphip. Crust. British Mus.: 352. pl. 55 fig. 5. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 31–23. ——Stebbing, 1888, Rep. Voy. Challenger, (Zool.) 29 (67): 1245–1248. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 21–23, pl. 1 figs. 10–11, pl. 3 figs. 17–20, pl. 5 figs. 15–17, pl. 6 figs. 6, 21. ——Mayer, 1903, Siboga Exped. Mon., 34: 33–34. ——Arimoto, 1929, Journ. Tokyo nat. Hist. Soc., 27 (38): 123–125, pl. 1. ——Hiro (=Utinomi), 1937, Annot. Zool. Japon., 16 (4): 311, pl. 22 figs. 3–4. ——Utinomi, 1947, Seibutsu (suppl.), 1: 69. ——Utinomi, 1958, Coll. Illustr. seashore Anim. Japan: 56, pl. 27 fig. 18. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14, pl. 2 fig. 4, pl. 3 figs. 1–2. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 15. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 69–70. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 31.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Apr. 2, 1928, Coll. no. 12, Aug. 17, 1928, Coll. no. 33, Aug. 21, 1928, Coll. nos. 31, 43, Aug. 23, 1928, Coll. no. 32; collected by Yaichiro Okada, Apr. 1, 1929, Coll. no. 79; Misaki, collected by Arimoto, July 15, 1929, Coll. no. 106, 123.

DESCRIPTION: Male: Body length of specimen 13.5 mm (Text-fig. 21, A); head and body smooth; pereonite V the longest of all segments, pereonites II, III and IV subequal in length and a little shorter than V, pereonite VI about one-third of V, and VII the shortest; eyes round and large.

Peduncle of antenna 1 very long and reaching beyond pereonite VII dorsally, segment 1 longer than head, segment 2 more than twice as long as 1, segment 3 a little longer than 2. Flagellum slender, being not so long as 2nd segment of peduncle, about 21–22 segments; antenna 2 shorter than peduncle of antenna 1, its segment 3 longer than 1 and 2 segments together, 4th segment longer than 3rd, and fringed with slender and short setae, flagellum 2-segmented, its 1st segment having spinules at 4 points.

Mandibular palp with 3 segments, 2nd and 3rd segment subequal in length, but the 1st being shortest, setal formula of terminal segment 1-x-y-1; incisor divided into 5 teeth, and top of lacinia mobilis divided into 5 teeth, prominent molar with a strong denticulate crown; maxillae 1 and 2 in usual form; inner lobe of maxilliped very small and scarcely extending beyond base of 1st segment of palp with several setae, outer lobe very long and large with an apical spine, and several setae on inner margin, palp of maxilliped 4-segmented, and segment 4 sharp.

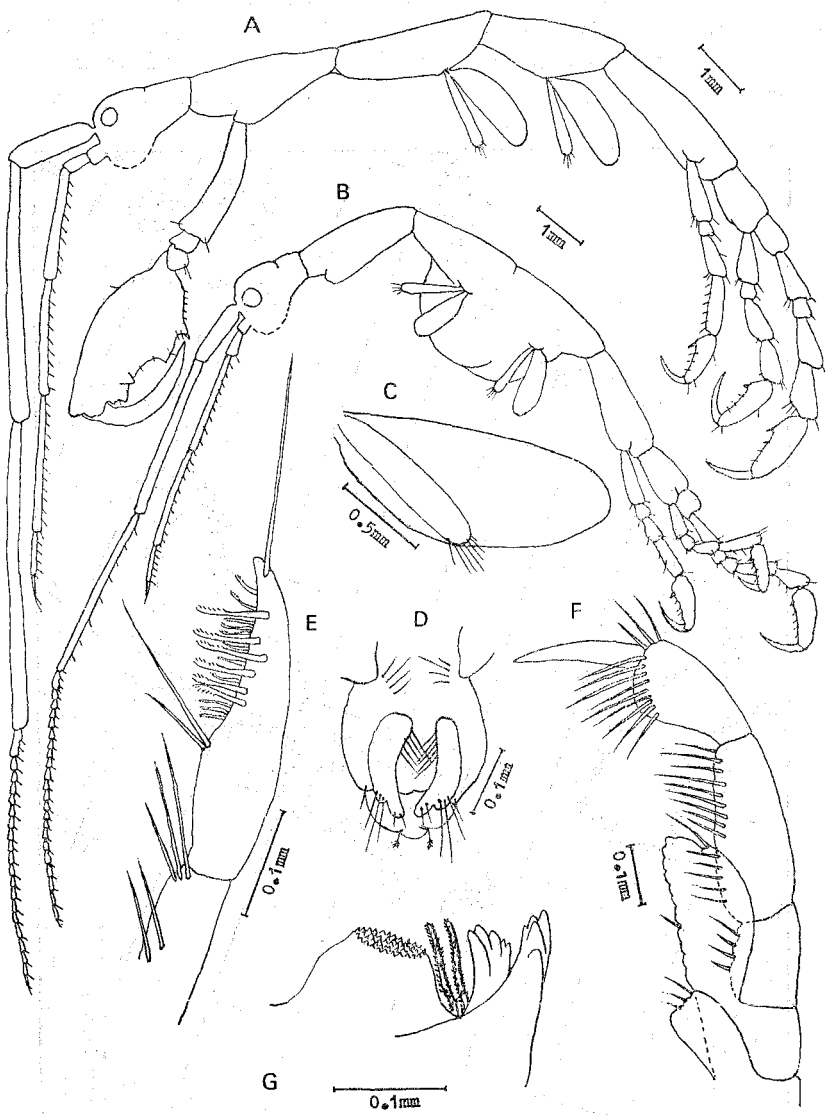

Fig. 21. *Protella gracilis* Dana.
A, male (material from Tateyama Bay, Chiba Pref., Coll. no. 12); B, female (ditto); C, gill and pereopod 3; D, abdomen of male; E, setae formula of the terminal segment of mandibular palp; F, maxilliped; G, mandible (ditto).

Gnathopod 2 situated rather to front part of pereonite II, extending about 3-times the length of pereonite II, the 1st segment shorter than its propodus, which is large, more or less oval, more than twice as long as broad, palmar spine located at base of palm, poison tooth big and strong, situated at center of palm, distal angle of palm triangular, and an indentation at a little distance from finger hinge forming a narrow tooth on one side, and triangular tooth large.

Pereopods 3 and 4 single-segmented, elongate and long with several setae on free margin; pereopods 5, 6 and 7 all 6-segmented, propodus of each about as long as its segment 4, with spinules at various points on hind margin, palm of each propodus with a proximal pair of grasping spines; gills large and oval.

Abdomen of male with a pair of appendages and a pair of lobes.

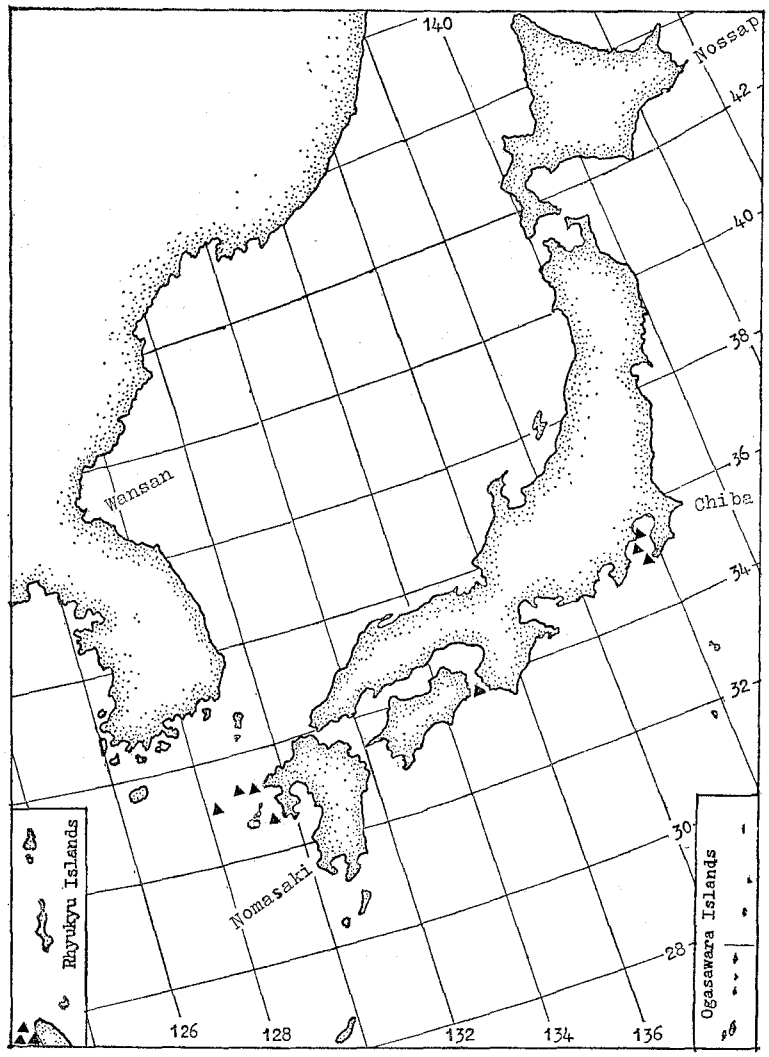

Fig. 22. Distribution records of *Protella gracilis* Dana around Japan.

Female: Body length of specimen 12 mm (Fig. 21, B); pereonite II subequal in length to III and a little longer than IV, V a little shorter than IV and considerably longer than next two pereonites together.

Propodus of gnathopod 2 with a palmar spine, poison tooth and triangular tooth, but smaller than male's tooth; abdominal appendages with a pair of lobes.

DISTRIBUTION: Type locality: Balabac Passage between Bornes and Philippines, 56.7 meters (Mayer, 1882).

Other records: Warm water species from Indo-Pacific Islands, Philippine Islands.

Localities around Japan and adjacent waters: Tateyama Bay (Arimoto, 1929: 9, Coll. no. 91); Misaki (Mayer, 1890: 21); Tanabe Bay (Hiro, 1937: 311); Nagasaki (Mayer, 1903: 33); Korean Straits (Mayer, 1903: 33); Formosa Straits (Mayer, 1903: 33); Kannon-Zukadasi, Amadaiba, east of Sagami Bay, 65–70 meters, Blih-Crust. 1797, (Utinomi, 1973: 31); Okinoyama, east of Sagami Bay, 90 meters, Blih-Crust. 1798, (Utinomi, 1973: 31).

Other collections: Tateyama Bay (Arimoto, 1928, Coll. nos. 31, 32, 33, 43); Tateyama Bay (Yaichiro Okada, 1929, Coll. no. 79); Misaki (Misaki Mar. Biol. Lab. 1929, Coll. no. 106).

Genus *Paracaprella* Mayer, 1890

Paracaprella Mayer, 1890, Fauna Flora Golf. Neapel, 17: 41.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; pereopods 3 and 4, 2-segmented, pereopod 5, 6-segmented; gills on pereonites III and IV; mandibular palp with 0–2 segments; abdominal appendages of male with a pair of single jointed appendages and a pair of lobes, female with a pair of lobes.

TYPE SPECIES: *Paracaprella pusilla* Mayer, 1890.

Key to species of *Paracaprella* around Japan and adjacent waters.

1. Three bluntly pointed teeth on ventrolateral margin on 3rd and 4th pereonites..... *crassa*
2. Without teeth on ventrolateral margin on 3rd and 4th pereonites ..... *tenuis*

15. *Paracaprella crassa* Mayer, 1903

(Jap. name: *Ikubi-warekara* Utinomi, 1968)

Figs. 23, 24.

Paracaprella crassa Mayer, 1903, Siboga Exped. Mon., 34: 66–67, pl. 2 figs. 32–33, pl. 7 figs. 48–50. ——Arimoto, 1929, Journ. Tokyo nat. Hist. Soc., 27 (38): 122–123, pl. 1. ——Utinomi, 1947, Seibutsu (suppl.), 1: 70. ——Utinomi, 1968, Publ. Seto mar. biol. Lab., 16 (4): 285–286 fig. 4. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 14. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 58.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Aug. 22, 1928, 1 male, attached to *Bugula* (Bryozoa), Coll. no. 47.

DESCRIPTION: Male: Body length of specimen 4.6 mm (Text-fig. 23); slender and smooth; pereonite V the longest of all pereonites, III and IV subequal in length, and a little shorter than V, II shorter than III, I a little shorter than head, VI and VII taken together a little shorter than II; head moderately large, but quite angular above, looking somewhat triangular as viewed from sides. Pereonite II terminating above to a prominently raised knob and bearing a strong forward-directed spine above, projection at base of gnathopod 2. Pereonites III and IV with 3 bluntly pointed teeth on ventrolateral margin on both side respectively, pereonite V smooth, and slender.

Antenna 1 about one-third as long as body length, peduncle 3-jointed, rather

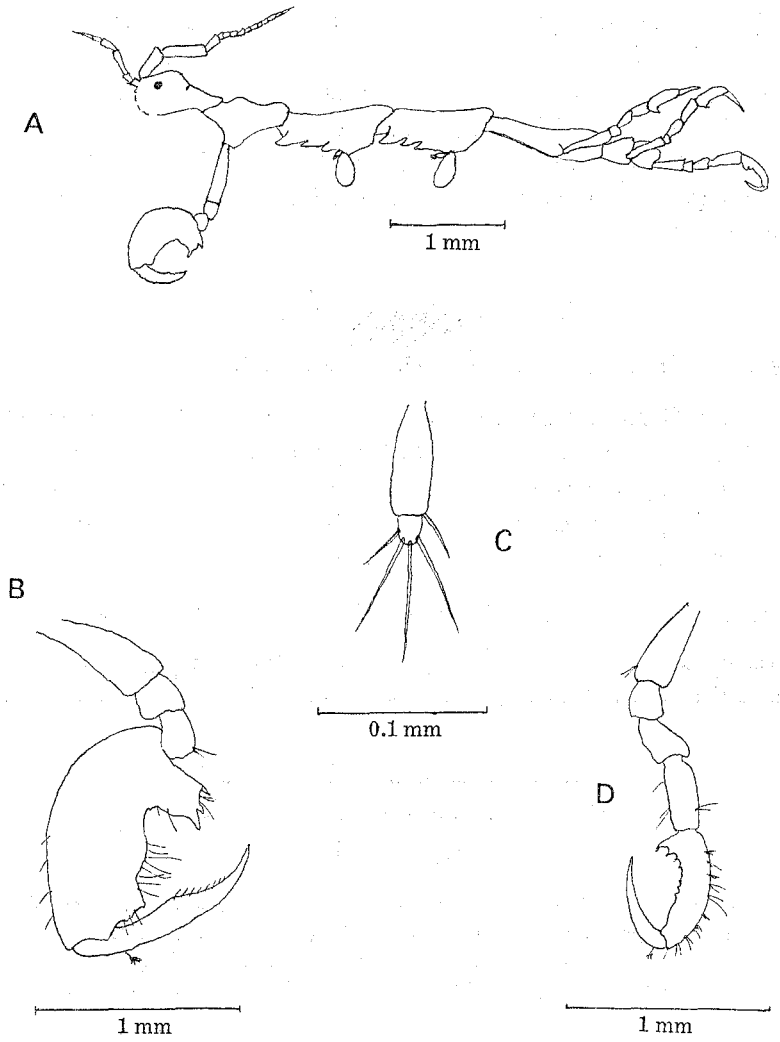

Fig. 23. *Paracaprella crassa* Mayer.
A, adult male; B, propodus of gnathopod 2 of male; C, pereopod 4; D, pereopod 7 (Arimoto, 1971).

plump flagellum 11-segmented; antenna 2 approximately equal to peduncle of antenna 1 in length, apparently not setose, with two-jointed flangella, swimming setae absent.

Gnathopod 2 peculiar, proximal angle of palm truncatedly projecting and bearing 3 teeth at its end; dactylus with convex inner surface, tapering proximally and distally, minutely setose.

Pereopods 3 and 4 rudimentary but clearly 2-segmented at base of gills, its segment 2 very much smaller than 1, and terminating into a few long setae, pereopods 5–7 normal, palmar margin of propodus slightly concave, serrate medially and strongly pointed proximally, convex rear margin has setules at 8–9 points.

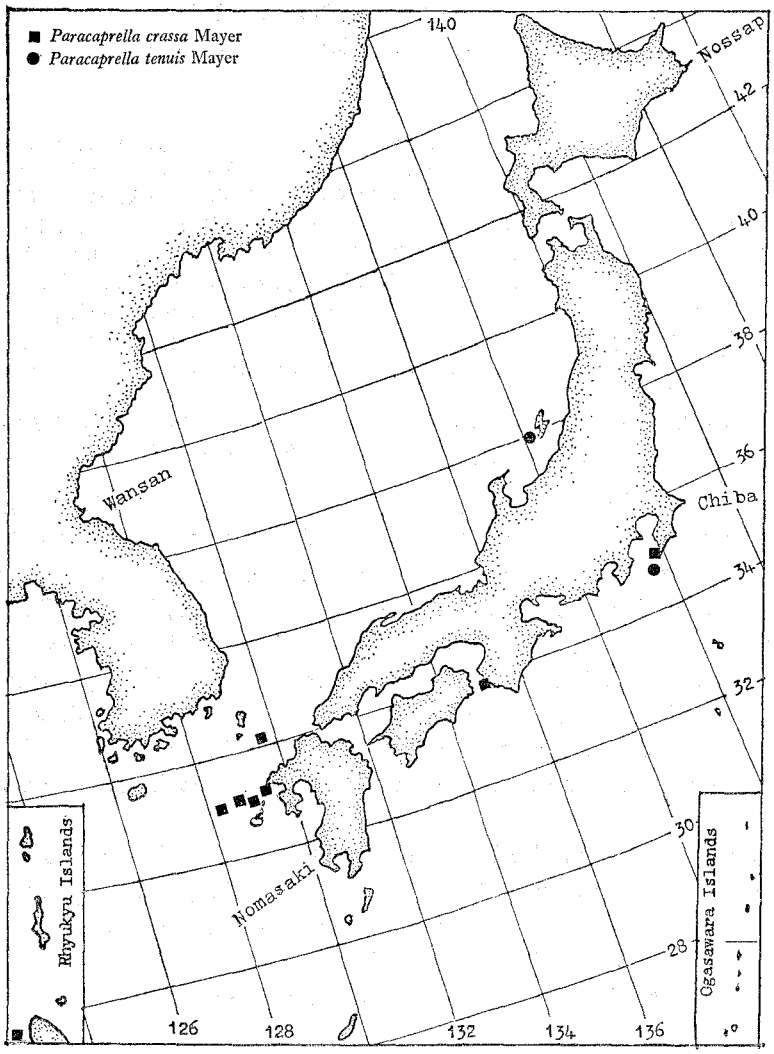

Fig. 24. Distribution records of *Paracaprella crassa* Mayer and *Paracaprella tenuis* Mayer around Japan.

Gills small, oval in form.

Abdomen of male has a pair of appendages and a pair of lobes, female has a pair of lobes.

DISTRIBUTION: Type localities: 34°15′ N., 128°51′ E.; 33°10′ N., 129°18′ E.; 33°05′ N., 128°22′ E.; 33°N., 129°25 E.; 33°N., 129°24′ E.; 33°N., 129° E.; 23°57′ N., 118°33′ E.; and China Sea, 50.96 meters.

Other localities around Japan and adjacent waters: The Korean Straits (Mayer, 1903: 66); Tateyama Bay (Arimoto, 1929: 122); Tanabe Bay (Utinomi, 1968: 285).

16. *Paracaprella tenuis* Mayer, 1903

(Jap. name: *Togenashiikubi-warekara* Arimoto, 1970)

Figs. 24, 25.

Paracaprella tenuis Mayer, 1903, Siboga Exped. Mon., 34: 68, pl. 2 figs. 34–35, pl. 7 figs. 51, 58. ——M.J. Rathbun, 1905, Occ. Pap. Boston Soc. nat. Hist., 7: 7, 77. ——Sumner, Osburn and Cole, 1913, Bull. United States Bur. Fish., 31: 657. ——McCain, 1965, Chesapeake Sci., 6 (3): 192–193, figs. 1d-e, 2g-k. ——McCain, 1968, Bull. United States Nat. Mus., 278: 86–89, figs. 43–44, 53. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 14. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 59. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (8): 61–63, figs. 11–12.

Paracaprella simplex Mayer, 1903, Siboga Exped. Mon., 34: 68, pl. 2 figs. 38–39, pl. 7 figs. 53–57. ——Cowles, 1930, Bull. United States Bur. Fish., 46 (1091): 351. ——Ferguson and Jones, 1949, Amer. Midl. Nat., 41 (2): 442. Type localities: Great Egg Harbor, New Jersey, U.S.A., and Hampton Roads, Virginia.

Deutella abracadabra Steinberg and Dougherty, 1957, Tulane Stud. Zool., 5 (11): 277–279, figs. 14, 17, 18, 20, 27. Type locality: "Alligator Harbor, Franklin County, Florida".

OCCURRENCE: Tateyama Bay, collected by Arimoto, Aug. 21, 1928, attached to *Bugula* (Bryozoa), 1 male, 1 female, Coll. no. 99; Tassha Bay, collected by a member of Sado Marine Biological Station and Arimoto, May 2, 1970, attached to rope for the cultivation of *Undaria pinnatifida*, depth 17 meters, 2 males, Coll. no. 400.

DESCRIPTION: Male: body slender, smooth, length 2.5 mm (Text-fig. 25, A); pereonites III and IV subequal in length, II shorter than III or IV, V rather longer than III or IV, VI and VII taken together about the same length as II; head moderately large, but quite angular just above, looking somewhat triangular as viewed from sides. Sometimes many small esthetic sensory hairs on the surface of body.

Antenna 1 about one-third as long as body length, peduncle 3-jointed, rather plump, flagellum, 4—6-segmented; antenna 2 a little longer than peduncle of antenna 1, its flagellum consists of 2 segments, swimming setae absent.

Mandibular palp with 2 segments which are very small, setae of terminal segment absent; outer lobe of maxilliped larger than inner lobe, terminal segment of palp not sharp.

Gnathopod 2 peculiar, proximal angle of palm truncatedly projecting and bearing a large poison tooth, and at base of angle there is a strong palmar spine, distal

angle of palm triangular and it is separated from poison tooth by a deep concavity.

Pereopods 3 and 4 rudimentary but clearly 2-segmented at base of gills, its segment 2 smaller than 1, and both terminating into a few long setae; pereopods 5–7 normal, palmar margin of propodus slightly concave, serrated medially and strongly pointed proximally.

Gills small, oval in form.

Abdomen has a pair of single-jointed appendages and has a pair of lobes.

Female: Body length of specimen 3.7 mm (Text-fig. 25, B), shape very like male; gnathopod 2 smaller than male, and its propodus not so well developed as in male; abdominal appendages has a pair of lobes.

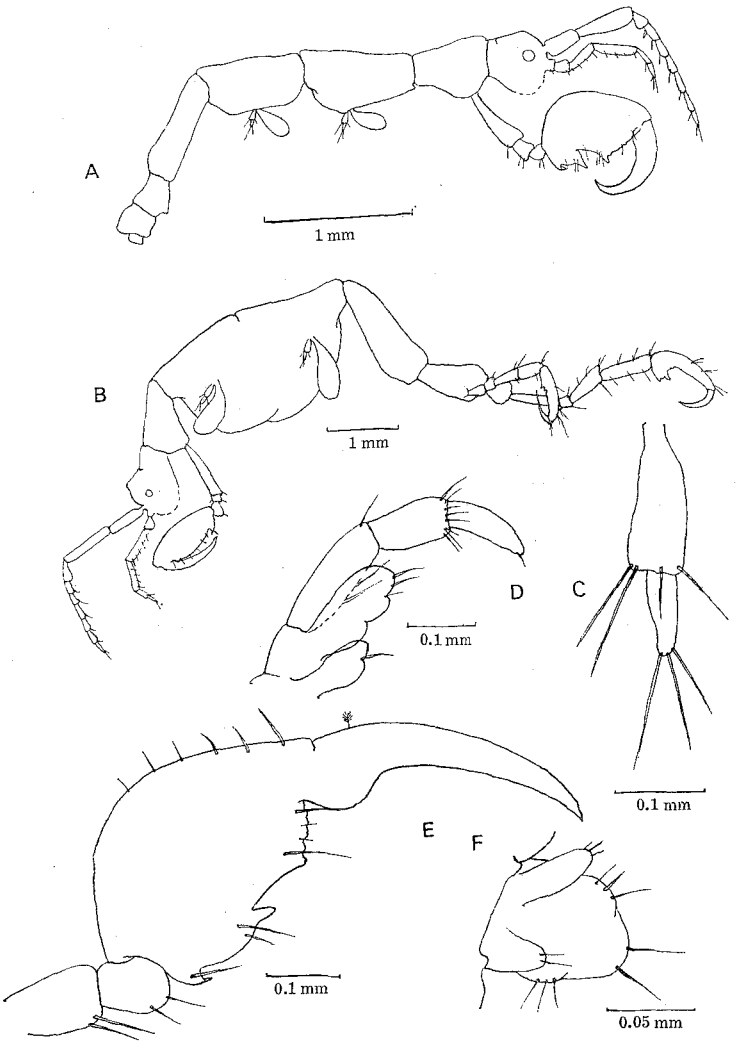

Fig. 25. *Paracaprella tenuis* Mayer.
A, adult male; B, adult female; C, pereopod 3; D, maxilliped; E, propodus of gnathopod 2 of male; F, abdomen of male (Arimoto, 1971).

GROWTH: A young male 2.5 mm long with no sensory hairs on surface of body, flagellum of antenna 1, 5-segmented.

DISTRIBUTION: Type locality: Woods Hole, Massachusetts.

Other records: Gulf of St. Lawrence to Sapelo Island, Georgia; Gulf Coast from Cumberland Sound, Florida to Port Isabel, Texas.

Localities around Japan: Tateyama Bay (Arimoto, 1970: 14); Tassha Bay, Sado Island (Arimoto, 1972, Coll. no. 400).

Genus *Hemiaegina* Mayer, 1890

Hemiaegina Mayer, 1890, Fauna Flora Golf. Neapel, 17: 40.

DIAGNOSTIC CHARACTERISTICS: 2nd antenna with 2-segmented flagellum; mandibular palp none; gills on pereonites III and IV; pereopods 3 and 4 at base of gills, and one-segmented; pereopod 5 normal; abdomen of male and female has a pair of 2-jointed appendages.

TYPE SPECIES: *Hemiaegina minuta* Mayer, 1890.

17. *Hemiaegina minuta* Mayer, 1890

(Jap. name: *Hime-warekara* Utinomi, 1969)

Figs. 26, 28.

Hemiaegina minuta Mayer, 1890, Fauna Flora Golf. Neapel, 17: 40, pl. 1 figs. 25, 27, pl. 3 figs. 32-35, pl. 5 figs. 52-53, pl. 6 figs. 13, 33–34, pl. 7 fig. 4. ——Mayer, 1903, Siboga Exped. Mon., 34: 65, pl. 6 fig. 75. ——Arimoto, 1930, Journ. Tokyo. nat. Hist. Soc., 28 (39): 45–47, fig. 2. ——? Barnard, 1937, Sci. Rep. John Murray Exped., 4 (6): 134, 198. ——Utinomi, 1947, Seibutsu (suppl.), 1: 70. ——Edmondson and Mansfield, 1948, Occ. Pap. Bishop Mus. Honolulu, 19 (10): 206–207, fig. 3. ——Steinberg and Dougherty, 1957, Tulane Stud. Zool., 5 (11): 281–283, figs. 8–11, 13, 29. ——Utinomi, 1964 in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14. ——McCain, 1965, Chesapeake Sci., 6 (3): 192. ——McCain, 1968, Bull. United States Nat. Mus., 278: 61–64, figs. 29–30, 50. ——Utinomi, 1969, Publ. Seto mar. biol. Lab., 16 (5): 297–299, fig. 2. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 25 (3): 15. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 51.

Hemiaegina quadripunctata Sundara Raj, 1927, Bull. Madras Gov. Mus., (n. ser.) (Nat. Hist.) 1 (1): 126–127, pl. 18.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Aug. 18, 1928, attached to *Sargassum*, 1 male, Coll. no. 36; 1 male, Coll. no. 64.

DESCRIPTION: Male: Body length of specimen 4.5 mm (Text-fig. 26) smooth; head coalesced with pereonite I, pereonites II-VI about equal in length, pereonite VII shorter than other segments.

Antenna 1 about two-thirds of body length, with 12–13-segmented flagellum; antenna 2 a little longer than peduncle of antenna 1, and its flagellum 2-segmented, swimming setae absent; mandibular palp none; inner lobe of maxilliped very small, outer lobe large, and extending beyond base of 2nd segment of palp, with 4 setae on inner margin, 4th segment of palp sharp. Gnathopod 2 located rather in front of pereonite II, its segment 1 sligltly shorter than twice of pereonite II, propodus

very large, at base of palm there is a large palmar spine, poison tooth situated at center, and a large triangular projection distally. Pereopods 3 and 4 very small and single segmented and circular in shape with only a few small setae; pereopod 5 long and normal, its propodus with a palmar spine, propodus of pereopod 6 bigger than that of 5, pereopod 7 large and broad, specially its propodus, palmar spine projection at base, several teeth at base of palm.

Gills narrow, oval, attached to pereonites III and IV. Penes central, abdomen with a pair of large biarticular appendages.

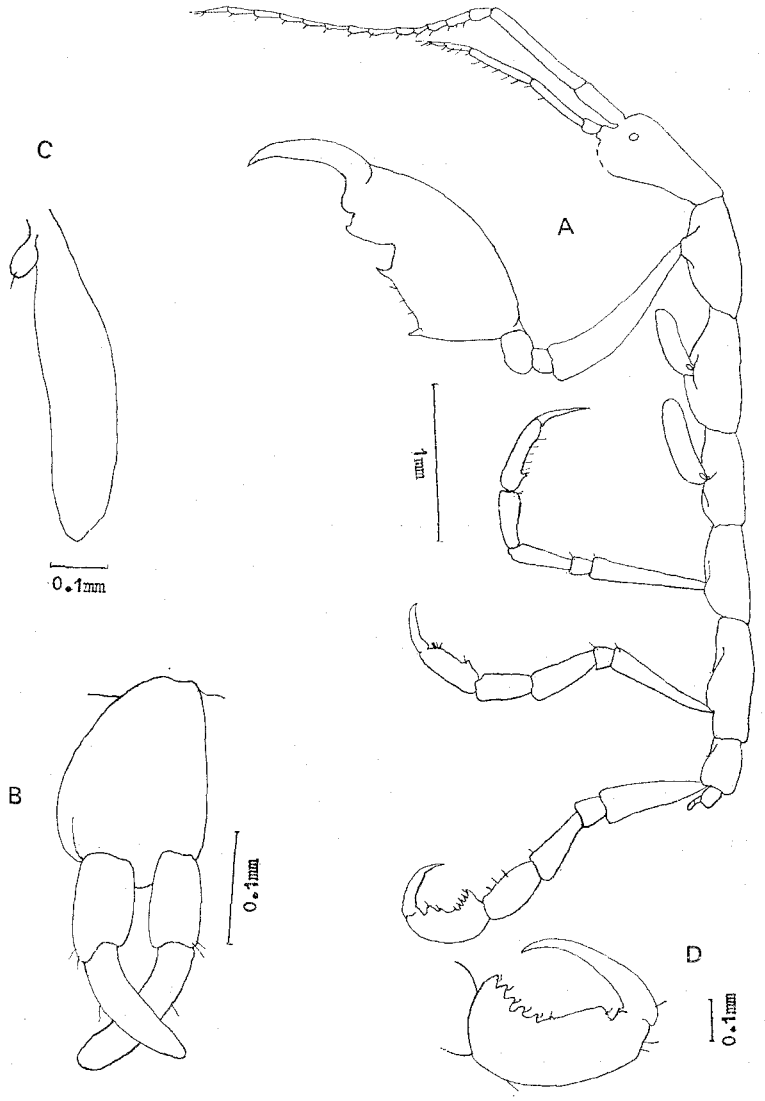

Fig. 26. *Hemiaegina minuta* Mayer.
A, male; B, abdomen of male; C, gill and pereopod 3; D, segments 5 and 6 of pereopod 7 (Arimoto, 1929).

Female: Slightly less than 4 mm in body length; similar to male in general features including abdominal appendages.

REMARKS: The specimen discribed by the author in 1930, has propodus of 2nd gnathopod of left side very much larger than right side.

DISTRIBUTION: Type locality: Off Amoy, China, 15–46 meters.

Other records: Off Bermuda; Virginia; Cape Hatteras, North Carolina; Elliot Key, Florida; Loggerhead Key, Tortugas; 29°44′ N., 88°23.5′ W.; Port Aransas, Texas; St. John, Virgin Islands; False Bay, South Africa; Australia; Krusadai Island, India; South Arabian Coast; Oahu, Hawaii; Bora Bora; 1°42.5′ S., 130°47.5′ E.; Fermantle, Australia.

Other localities around Japan: Tateyama Bay (Arimoto, 1930); Nomosaki, Nagasaki (Utinomi, 1964).

Genus *Metacaprella* Mayer, 1903

Metacaprella Mayer, 1903, Siboga Exped. Mon., 34: 72.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2, 2-segmented; pereopods 3 and 4 absent, pereopod 5, 6-semgented; gills on pereonites III and IV; no mandibular palp; abdomen in male with a pair of 2-jointed appendages and a pair of lobes, female with a pair of one-jointed appendages and a pair of lobes.

TYPE SPECIES: Selected by Dougherty and Steinberg (1953, Proc. biol. Soc. Washington, 66: 48): *Caprella kennerlyi* Stimpson, 1864.

18. *Metacaprella anomala* (Mayer), 1903

(Jap. name: *California-warekara* Arimoto, 1971)

Figs. 27, 28.

Caprella anomala Mayer, 1903, Siboga Exped. Mon., 34: 93–94, pl. 3 fig. 38, pl. 7 figs. 71–72, pl. 9 fig. 74. ——Arimoto, 1934, Dobuts.-Zasshi, 46 (553): 494–496, pl. 1 figs. 1–2, pl. 3 figs. 1, 7, 16, 26. ——Arimoto, 1970, Bull. Biogeogr. Soc. Japan, 26 (3): 14.

Metacaprella anomala Dougherty and Steinberg, 1953, Proc. biol. Soc. Washington, 66: 44, 47. ——Dougherty and Steinberg, 1954, in Light et al., Intertidal Invert. Centr. California Coast: 170, 171. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 53.

OCCURRENCE: Off Hachinohe (40°30′ N., 141°51′ E.) collected by the T/S Soyo-Maru belonging to Fisheries Experimental Station of the Department of Agricuture and Forestry, Nov. 2, 1926, 1 male, depth 91 meters, Coll. no. 501; Tanabe Bay, collected by Yaichiro Okada, May 4, 1929, Coll. no. 89.

DESCRIPTION: Male: Body length of specimen 17 mm (Text-fig. 27, A); pereonite V the longest of all, pereonite II a little shorter than V, III or IV a little shorter than II, VI and VII taken together a little shorter than III or IV, pereonite I and head taken together a little shorter than II; head with median anterior spine and a pair of small spines on back, pereonite V with a pair of large dorsal spines in rear part and with a pair of little spines dorsally at fore end, a pair of dorsal spines

on pereonites VI and VII, pereonite III and IV with lateral spines on front part.

Antenna 1 about two-thirds of entire length of body, its peduncle has few setae, flagellum as long as peduncle, 19- to 20-segmented, and three setae on inner side of 1st segment; antenna 2 a little longer than peduncle of antenna 1, segments 3 and 4 of peduncle with many strong setae; flagellum, 2-segmented, its 1st segment with strong setae on inner margin.

Molar of mandible strong, incisor divided into 5 teeth, top of lacinia with 5 teeth, setal row with 2 or 3 setae; outer lobe of maxilla is slightly narrower apically than inner, with 7 two-branched fork-like strong teeth, and few spines, segment 1 of

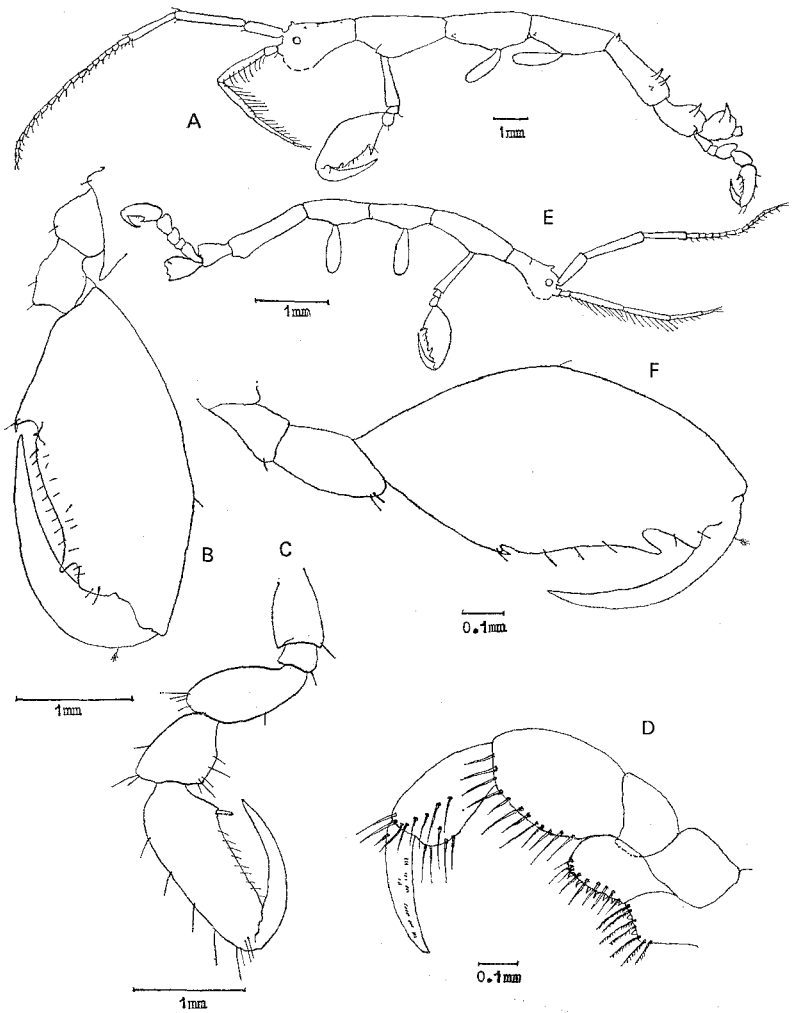

Fig. 27. *Metacaprella anomala* (Mayer).
A, adult male (material from Hachinohe Bay, Aomori Pref., Coll. no. 501); B, propodus of gnathopod 2 of adult male; C, pereopod 6 of adult male; D, maxilliped of male; E, young male (material from Tanabe Bay, Wakayama Pref., Coll. no. 89); F, propodus of gnathopod 2 of young male.

palp shorter than 2, which is longer than outer lobe and twice as long as of its width, apical and lateral margin with 15–17 strong spines; outer lobe of maxilla 2 with many long spines on apical margin, inner lobe shorter and more oval than outer, with some slender spines rounded apically; inner lobe of maxilliped a little smaller than outer, with 2 strong apical teeth, and several pulmate spines, outer lobe a little longer than inner, with 8 teeth and many long spines on inner margin, segment 1 of palp as long as outer lobe, 2 about twice as long as 1, with several long spines on apical and inner margin, 3 shorter than 2, with long spines on apical margin, and slightly widened apically, dactylus pointed.

Segment 1 of gnathopod 1 about twice as long as its greatest breadth, segment 2

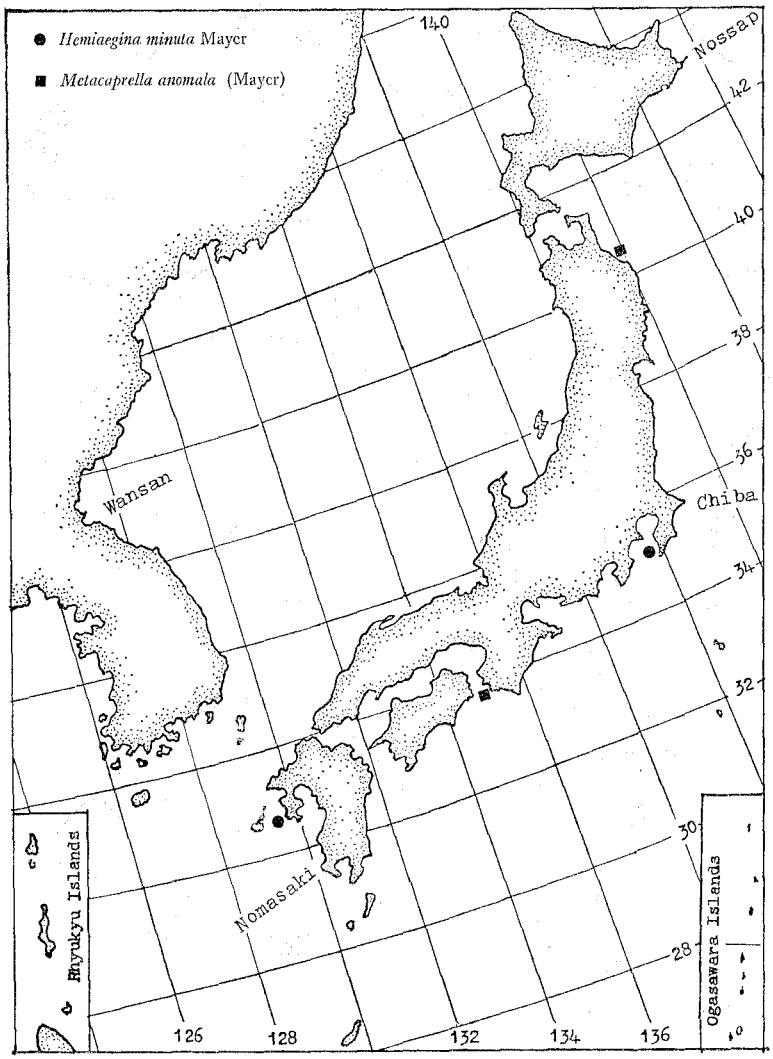

Fig. 28. Distribution records of *Hemiaegina minuta* Mayer and *Metacaprella anomala* (Mayer) around Japan.

a little shorter than 1 and its breadth, segment 3 longer than 2 having a group of spines on surface near front, and another group of the same at posterior lower angle, wrist rather broad than long, lamellate and armed with many spines on inner margin, propodus as long as segment 1, and wider, narrowing to distal end, palmar margin has many spines and 2 proximal grasping spines on inner surface; ganthopod 2, attached to rather front part of pereonite II, its segment 1 longer than half of pereonite II, widened a little distally, with front apex a little produced, propodus large and twice as long as broad, palm evenly curved with a small proximal projection as grasping spine, poison tooth situated near by a triangular tooth at distal angle of palm, palm fringed with many small spines.

Pereopod 6 about 5.5 mm long, segment 1 widening distally from a narrow neck, longer than broad, with some spines at apex, segment 2 short and narrow, segment 3 a little longer than 1, spines about distal margin, segment 4 a little longer than 3, with several apical spines, propodus a little longer than twice of 4, with palmar grasping spines at a distance from base of about one-third of its total length, palm with many small spines, outer margin fringed of slender spines at 5 points.

Gills on pereonites III and IV, elliptical.

Abdomen with a pair of biarticle appendages, and a pair of lobes in male, with a pair of one-jointed appendages and a pair of lobes in female.

GROWTH: Young male, from Tanabe Bay collected by Yaichiro Okada, May 4, 1929; body length of specimen 5.5 mm (Text-fig. 27, E), smooth, but bearing one small acute spine above on head, without any other frontal, dosal and lateral spines on pereonites; flagellum of antenna 1, 13-segmented; propodus of gnathopod 2 a little longer than twice of its breadth, palm evenly curved, with a very small spine basally, poison tooth larger than in adult, palm with few spines.

DISTRIBUTION: Type locality: Pacific Grove, California.

Other records: Frenchman's Reef, Kelp Cove, and Monterey Bay, California.

Other localities around Japan: Off Hachinohe Bay (Arimoto, 1934: 494); Tanabe Bay (Arimoto, 1970: 14).

Genus *Caprella* Lamarck, 1801

Caprella Lamarck, 1801, Syst. Anim. s. Vert.: 165. Type species, selected by Latreille (1810, Consid. gén. Crust. Arachn. Ins.: 104, 423): *Cancer linearis* Linnaeus, 1767.

Liparis Bosc, 1801~1802, Hist. nat. Crust., 1: 79. Type species, by monotype: *Squilla lobata* O. F. Müller, 1776 (=*Cancer linearis* Linnaeus, 1767). Not *Liparis* Scopoli, 1777 (Pisces).

Capreola De Brébisson, 1825, Mém. Soc. Linn. Calvados, 2: 252. Erroneous spelling of *Caprella* Lamarck, 1801.

Haploarthron Schurin, 1935, Zool. Anz., 112: 202. Type species, by monotype: *Haploarthron laeve* Schurin, 1835.

DIAGNOSTIC CHARACTERISTICS: Flagellum of antenna 2 biarticulated; pereopods 3 and 4 absent, pereopod 5, 6-segmented; gills on pereonites III and IV; mandible without palp; abdomen of male with a pair of appendages and a pair of lobes, female with a pair of lobes.

Key to species of *Caprella* in the Japanese and adjacent waters

GROUP A. Head, viewed laterally, smoothly rounded above in adult (=subgenus *Caprella* sensu stricto)
GROUP B. Head, viewed laterally, rounded and with one to several upright projections above in adult (=subgenus *Spinicephala*, n.)
GROUP C. Head, viewed laterally, angularly produced anteriorly, and often with a frontal projection in adult (=subgenus *Rostrhicephala*, n.)

GROUP A: Subgenus *Caprella* sensu stricto

1. a. Without projections on body 2
   b. With projections on body 6
2. a. Basal segment of gnathopod 2 a little shorter than one-third of pereonite II in adult male 3
   b. Basal segment of gnathopd 2 a little shorter than half of pereonite II in adult male 4
   c. Basal segment of gnathopod 2 a little shorter than pereonite II in adult male ..... *subtilis*
3. a. Propodus of gnathopod 2 of rectangular form in adult male ..... *japonica*
   b. Propodus of gnathopod 2 of oval form ..... *venusta*
   c. Propodus of gnathopod 2 roughly of diamond form in adult male ..... *okadai*
4. a. Segment 3 of peduncle of antenna 1 very much shorter than 2 ..... *decipiens*
   b. Segment 3 of peduncle of antenna 1 a little shorter than 2 5
   c. Segment 3 of peduncle of antenna 1 a little longer than 2 in adult ..... *gracillima*
5. a. Pereonite V longer than IV in adult ..... *laevis*
   b. Pereonite V a little shorter than IV in adult ..... *mixta*
6. a. Ventral spine present between insertions of gnathopods 2 ..... *iniquilibra*
   b. With dorsal projection but without lateral projection 7
   c. Without dorsal projection but with lateral projection 9
   d. With dorsal projection and lateral projection 10
7. a. Pair of dorsal projections on pereonite IV in adult male 8
   b. Many small dorsal projections on pereonites II to VII in adult male ..... *eximia*
8. a. End of pereonite IV without prominently raised projection ..... *simplex*
   b. End of pereonite IV with prominently raised projection ..... *monoceros*
9. a. Lateral spine above point of articulation of gill in adult ..... *kroyeri*
   b. Lateral spine at fore end of pereonites III and IV in adult ..... *laeviuscula*
10. a. Dorsal projections on pereonites I to VII in adult male 11
   b. Dorsal projections on pereonites II to VII in adult male ..... *bispinosa*
   c. Dorsal projections on pereonites III to VII in adult male 13
   d. Dorsal projections on pereonites IV to VII in adult male ..... *aino*
   e. Dorsal projections on pereonites V to VII in adult male ..... *irregularis*
   f. Small dorsal prejections on pereonites II to V in adult male ..... *nagaoi*
   g. Dorsal projections on pereonite IV in adult male ..... Mayer's sp.
11. a. No dorsal projections at end of pereonite I ..... *imaii*
   b. A pair of acute dorsal projections at end of pereonite I 12
   c. Many small tubercles on surface of pereonites I to VII in adult male ..... *soyo*
12. a. Triangular tooth of propodus of gnathopod 2 normal ..... *carinata*
   b. Triangular tooth of propodus of gnathopod 2 large and long ..... *longidentata*
13. a. Hind end of pereonite IV without prominently raised projection ..... *mutica*
   b. Hind end of pereonite IV with prominently raised projections ..... *bidentata*

GROUP B: Subgenus *Spinicephala*, n.

1. a. Head with one small projection avove 2
   b. Head with one acute long projection above 5
   c. Head with two pairs of small projections above 11
   d. Head with many small projections above 12
2. a. Two pairs of small projections on pereonite V in adult male ..... *cristibrachium*
   b. About three pairs of large dorsal teeth on pereonite V in adult male 3

3. a. Pereonites III and IV with three dorsal teeth in adult ..... *verrucosa*
   b. Pereonites III and IV with many dorsal teeth in adult 4
4. a. Pereonite V subequal to IV in length ..... *septentrionalis*
   b. Pereonite V a little shorter than IV ..... *borealis*
5. a. Pereonite II without dorsal spines in adult male 6
   b. Pereonite II with a pair of dorsal spines in adult male 10
   c. Pereonite II with two pairs of dorsal spines in adult male ..... *vidua*
6. a. Basal segment of gnathopod 2 a little longer than about one-third of pereonite II and without dorsal tooth on pereonite V in adult male ..... *chelimana*
   b. Basal segment of gnathopod 2 a little shorter than pereonite II and with dorsal tooth on pereonite V in adult male 7
   c. Basal segment of gnathopod 2 a little longer than pereonite II and without dorsal tooth on pereonite V and propodus of gnathopod 2 very long in adult male ..... *gigantochir*
7. a. Pereonite V with a dorsal spine in adult male ..... *californica*
   b. Pereonite V with two pairs of dorsal spines in adult male 8
8. a. Dorsal hind end of pereonite IV without an upright projection ..... *scaura typica*
   b. Dorsal hind end of pereonite IV with an upright projection 9
9. a. Hind end of pereonites I-III without a forward-inclining acute dorsal spine..... *scaura diceros*
   b. Hind end of pereonites I-III with a forward-inclining acute dorsal spine..... *scaura hamata*
10. a. Penes separate ..... *rhopalochir*
    b. Penes middle ..... *simia*
11. a. Many small tubercles on pereonites I to V ..... *cilluroantennata*
    b. Many small projections on pereonites II to VII in adult male ..... *acanthogaster*
12. a. Body with many large blunt teeth on back in adult..... *paurina*
    b. Body with many large serrated teeth on back in adult ..... *polyacantha*

GROUP C: Subgenus *Rostrhicephala*, n.

1. a. Angularly produced very short spine on head 2
   b. Angularly produced blunted short spine on head ..... *penantis*
2. a. Dorsal spines absent on pereonites 3
   b. Pereonite V with a pair of dorsal spines ..... *obtusifrons*
   c. Pereonites V-VII each with a pair of dorsal spines ..... *brevirostris*
3. a. Ventral spine absent on pereonite II 4
   b. Ventral spine present between gnathopods 2 ..... *equilibra*
4. a. Palmar spine of gnathopod 2 at base..... 5
   b. Palmar spine of gnathopod 2 at forward edge, proximal part of propodus of gnathopod 2 very narrow ..... *subinermis*
5. a. Basal segment of gnathopod 2 very short ..... *drepanochir*
   b. Basal segment of gnathopod 2 about half as long as pereonite II in adult..... *algaceus*
6. a. Palmar margin of gnathopod 2 narrow and without subpalmar spine in adult ... *danilevskii*
   b. Palmar margin of gnathopod 2 normal and with three subpalmar spines in adult... *tsugarensis*

a) Subgenus *Caprella* Lamarck, sensu stricto

TYPE SPECIES: *Cancer linearis* Linnaeus, 1767.

The head is spherical or oval-shaped without projections or spines in adult.

The follwing species, all belonging to subgen. *Caprella*, are collected widely throughout the world, but hitherto no record has been made from the Japanese waters.

Astericola Jankowski et Vassilenko, *mitis* McCain, *pilidigita* Laubitz, *rapax* Mayer, *eurydactyla* Vassilenko, *ungulina* Mayer, *bathyalis* Vassilenko, *bacillus* Mayer, *hirsuta* Mayer, *telarpax* Mayer, *triodous* Stebbing, *acanthifera* Leach, *centrota* Vassilenko, *cornigera* Haswell, *greenleyi* McCain, *linearis* Linnaeus, *gracilior* Mayer, *microtuberculata* Sars, *aculeata* Dana, *rudiuscula* Laubitz, *tenella* Dana, *oxyarthra* Vassilenko, *excelsa* Vassilenko.

19. *Caprella (Caprella) japonica* (Schurin), 1935

(Jap. name: *Nippon-warekara* Arimoto, 1971)

Figs. 29, 30.

Eugastraulax japonicus Schurin, 1935, Zool. Anz., 112 (7–8): 200–202, fig. 2. ——Schurin, 1937, Explor. Mers USSR, 23: 29–30, 35–36, figs. 9–10. ——Utinomi, 1947, Seibutsu (suppl.), 1: 70–71, figs. 1–2. ——Stschapova, Mokyevsky and Pasternak, 1957, Trudy Okeanol. Akad. Nauk USSR, 23: 87. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 50.

Caprella japonica Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 17.

No specimen in the author's collection.

DESCRIPTION: With reference to Utinomi's (1947).

Male: Body length of specimen 19.5 mm (Text-fig. 29, A) smooth; pereonites III and IV subequal and longer than any other pereonite, II and V subequal and

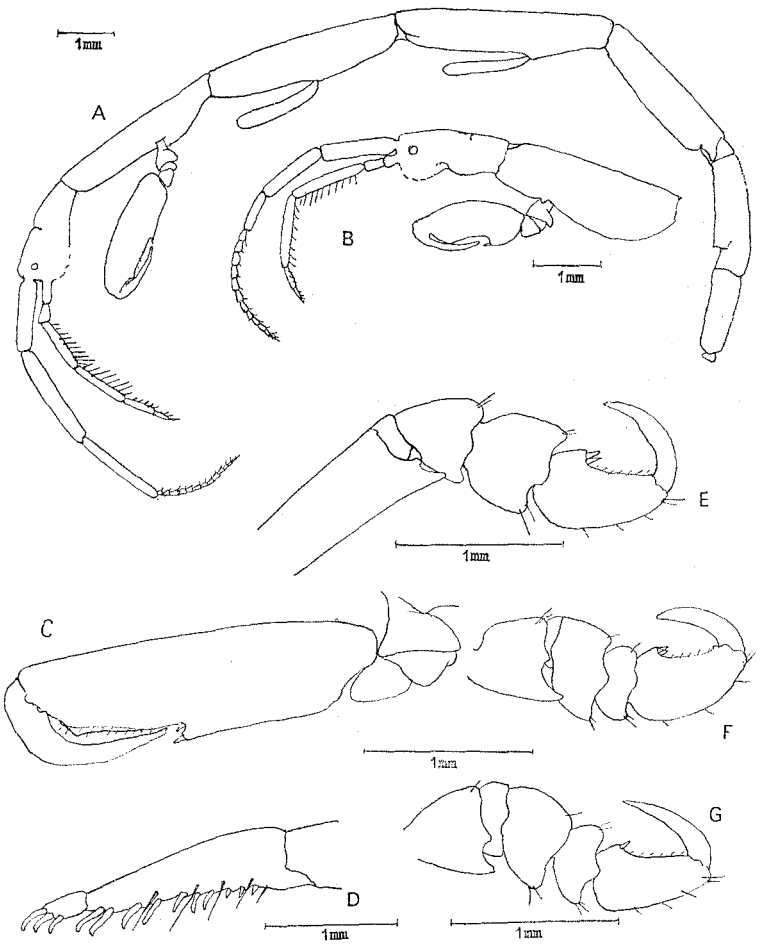

Fig. 29. *Caprella (Caprella) japonica* (Schurin) (after Utinomi).
A, adult male; B, front part of young male; C, propodus of gnathopod 2 of adult male; D, flagellum of antenna 2; E, pereopod 7; F, pereopod 6; G, pereopod 5.

a little shorter than III or IV, VI a little shorter than V, VII a little shorter than VI, and I subequal to head length.

Antenna 1 a little shorter than one-third of body length, its flagellum 12- or 13-segmented; antenna 2 a little shorter than peduncle of antenna 1, with setae, and flagellum 2-segmented.

Cutting edge of incisor of mandible divided into 5 or 6 large unequal teeth, lacinia mobilis with a general similarity to principal plate, with its distal edge cut into numerous denticles, molar slightly prominent, with circular denticulate small crown; outer lobe of 1st maxilla larger than palp, with dentate distal margin carrying 2 or 3 fork-like branched strong teeth, 1st segment of palp very short, 2nd segment longer than outer lobe, with 5 strong spine teeth and many long spines; 2nd maxilla usual in shape; maxilliped differing from that of other species in shape, its inner lobe small with several setae at apical margin, the outer lobe longer than the inner, and scarcely extending beyond base of segment 2 of palp, having several

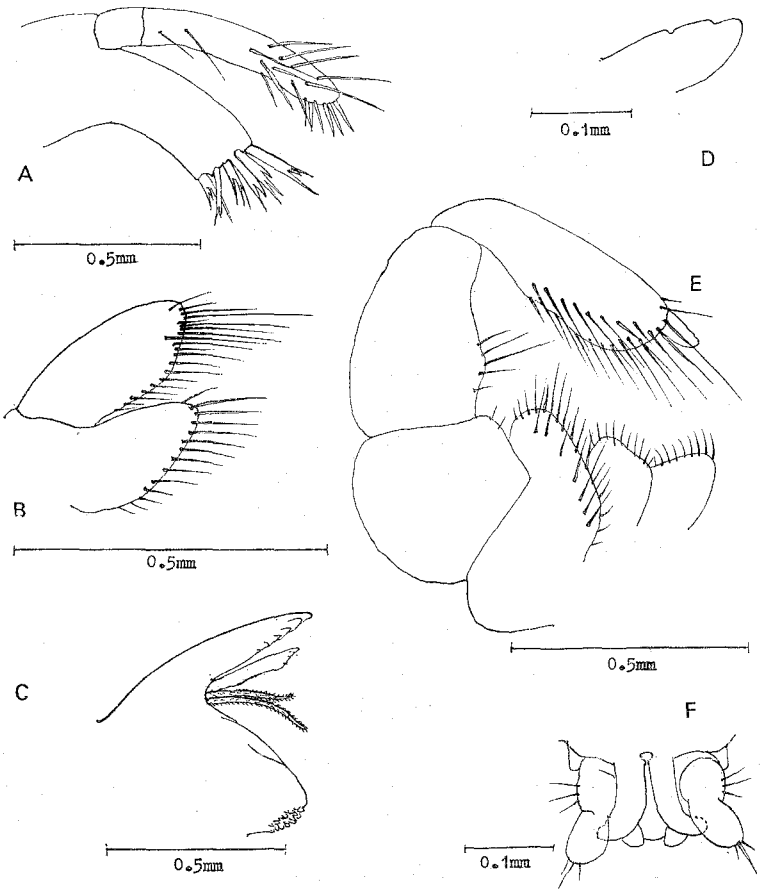

Fig. 30. *Caprella* (*Caprella*) *japonica* (Schurin) (after Utinomi).
A, maxilla 1; B, maxilla 2; C, mandible; D, segment 4 of palp of maxilliped; E, maxilliped; F, abdomen of male.

spines at apical and inner margins, segment 1 of palp large and subequal to the breadth in length, segment 2 longer than 1, and with a few spines at inner margin, segment 3 a little longer than 2, and widened distally, with many long spines at apical and inner margin of gradually increasing length as they approach outer corner, segment 4 very small, short and not pointed at apex.

Gnathopod 2 attached to about middle part of pereonite II, its basal segment very short, and shorter than its breadth, propodus about 4 times as long as broad, having rectangular form, palmar spine at middle part of palm and with a subspine, triangular tooth distally, palm with several setae; pereopod 5 shorter than any other pereopod, its segment 1 shorter than its breadth, 3 shorter than 1, 4 shorter than 3, 2 being the shortest, length of propodus of pereopods 5–7 almost twice its breadth, with 2 grasping spines basally, pereopod 6 longer than 5, and 7 longer than 6.

Gills long and linear.

Penes medial, long and the distal end curved outward.

Female: Antenna 1 shorter than that of male; and its peduncle shorter than antenna 2; pereonite I almost half of head in length; propodus of gnathopod 1 narrowing distally, palm with serrated margin; gnathopod 2 attached to rather front part of pereonite II, propodus not so long as in male, and outer edge slightly convex, length more than twice of its greatest breadth.

DISTRIBUTION: Type locality: Peter the Great Bay.

Other records: Putjatin Island, Sea of Japan.

Other locality around Japan: Suzaki, Shizuoka (collected by Tokioka, 1947, Utinomi, 1947: 70–71).

REMARKS: Schurin, A. (1935) treated this species as belonging to a different genus from *Caprella*; because unlike *Caprella*, it has very long penes, considerably crocket outsides, and a small finger of maxilliped indented on outer edge.

Such features, however, are not serious points in the classification of genera of caprellids. H. Utinomi (1947) doubts whether *Eugstraulax* may well be classified as a different genus from *Caprella* by these peculiarities. Utinomi's opinion seems to the present author to be justifiable. In fact, *Caprella tsugarensis* and *C. okadai* have also a small finger in maxillipeds.

20. *Caprella (Caprella) venusta* Utinomi, 1943

(Jap. name: *Asamushi-warekara* Utinomi, 1971)

Fig. 31.

Caprella venusta Utinomi, 1943, Sci. Rep. Tohoku Imp. Univ., (Biol. 4), 17 (3): 285–287, fig. 6. ——Utinomi, 1943, Journ. Fac. Sci. Hokkaido Imp. Univ., (6), 8 (3): 297–298. ——Utinomi, 1947, Seibutsu (suppl.), 1: 79–80. ——Sando, 1964, Bull. mar. biol. Sta. Asamushi, 12 (1): 31. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 45. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 46. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 37.

No specimen in the author's collection.

OCCURRENCE: Asamushi, collected by N. Abe, Feb. 1938, attached to *Sargas-*

sum thunbergi, 2 males (Utinomi, 1943: 297).

DESCRIPTION: With reference to Utinomi's (1943).

Male: Body length of specimen 12.2 mm (Text-fig. 31, B), slender and smooth; preonite III the longset of all segments, IV a little shorter than III, II a little shorter than IV, V a little shorter than II, I a little shorter than head, VI a little shorter than I, VII a little shorter than VI.

Flagellum of antenna 1, 16-segmented and a little longer than peduncle; antenna 2 slightly longer than peduncle of antenna 1, and flagellum fringed with paired serrated bristles.

Gnathopod 2 attached to nearly middle of pereonite II, segment 1 about half as long as propodus and smooth, not pointed distally, propodus oblong, evently convex on front and hind margins, palm long with a sharp poison tooth distally, se-

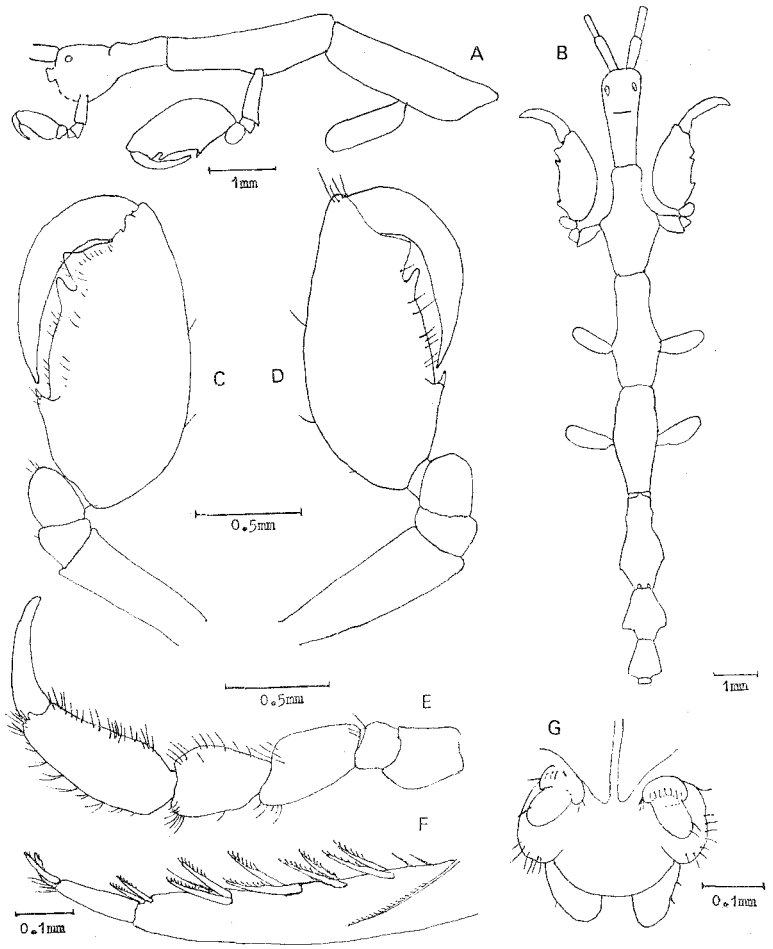

Fig. 31. *Caprella* (*Caprella*) *venusta* Utinomi (after Utinomi).
A, male; B, male, dorsal view; C, propodus of gnathopod 2 of young male; D, propodus of gnathopod 2 of adult male; E, pereopod 7; F, flagellum of antenna 2; G, abdomen of male.

parated by a narrow sinus from triangular distal projection, palmar angle nearly proximal, projecting down-ward, and armed with a spine at its end, palm fringed with several small spines, dactylus long, with smooth inner margin; 3 pairs of pereopods of 5, 6 and 7 somewhat slender, propodus of pereopod 7 about twice as long as wide, and grasping spines absent. Penes medial; abdomen of ordinary type, with a pair of appendages and a pair of lobes.

DISTRIBUTION: Type locality: Asamushi, Mutsu Bay.

Other localities around Japan: Muroran (Utinomi, 1943: 296); Akkeshi (Utinomi, 1943: 297); Asamushi (Utinomi, 1943: 285); Akkeshi Bay, off Tsukushi Koishi (Utinomi, 1973: 37); Kugurizaka, Aomori Bay (Utinomi, 1973: 37).

21. *Caprella (Caprella) okadai* Arimoto, 1930

(Jap. name: *Okada-warekara* Arimoto, 1971)

Fig. 32.

Caprella okadai Arimoto, 1930, Journ. Tokyo Nat. Hist. Soc., 28 (39): 52–54, pl. 2 figs. 1–11.—— Utinomi, 1947, Seibutsu (suppl.), 1: 75. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 32.—— Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 43.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Aug. 21, 1928, attached to *Sargassum,* 1 adult male and 1 young male, Coll. no. 40.

DESCRIPTION: Male holotype: Body 6.5 mm in length, slender and smooth; the length of pereonites III and IV subequal, II and V equal, and a little shorter than III, VI and VII taken together, subequal to III, head smoothly rounded above.

Antenna 1 a little shorter than half of body length, segments 1 and 2 of peduncle subequal, 3 being half length of 1, flagellum, 10- or 11-segmented; antenna 2 longer than peduncle of antenna 1, with setae, flagellum 2-segmented, its segment 1 with 5 strongly plumate spines, and terminal segment with 2 spines.

Terminal end of mandibular incisor divided into about 5 teeth, lacinia mobilis slightly toothed, prominent molar large, setal row of 2 or 3 plumose setae; outer lobe of maxilla 1 apically a little narrower than base, with 5 strong fork-like teeth, segment 1 of palp short, segment 2 longer than outer lobe, widening distally, with 8 slender spines; maxilla 2 usual; inner lobe of maxilliped having 2 spine teeth and several spines on apical margin, outer lobe subequal to inner lobe, 2 teeth and several spines on lateral margin, segment 1 of palp longer than its breadth, 2 shorter than twice of 1, with several long spines on inner margin, 3 a little shorter than 2 and narrower at base and apical part, with long spines on inner margin, apical segment the shortest and narrow but not pointed.

Propodus of gnathopod 1, much longer than wrist narrowing distally, palm straight with setules and defined by a couple of palmar spines basally, several setiform spines about surface of propodus; gnathopod 2 attached to rather front part of middle of pereonite II, segment 1 very short, its length about two-thirds of breadth, 2 about half of 1 in length, 3 a little longer than 1 and with several setae along inner margin, propodus very large and roughly oval in shape, tapering proximally and

distally, a small palmar spine at base of palm, triangular tooth distally, palm rectilinear with several minute spines; pereopod 6 longer than 5, 7 longer than 6, and its segment 1 longer than any other segment, segments 3 and 4 of pereopod 5 subequal in length, 5 about three-times of 4, with a few small setae on palmar margin and without palmar spines, but sometimes with a small one, and dactylus with several spines at distal part.

Gills elongate, attached to pereonites III and IV.

Abdomen in male has a pair of appendages provided with 5 to 7 short spine teeth and two spines.

Type specimen figured herein from Arimoto's private collection, Coll. no. 40.

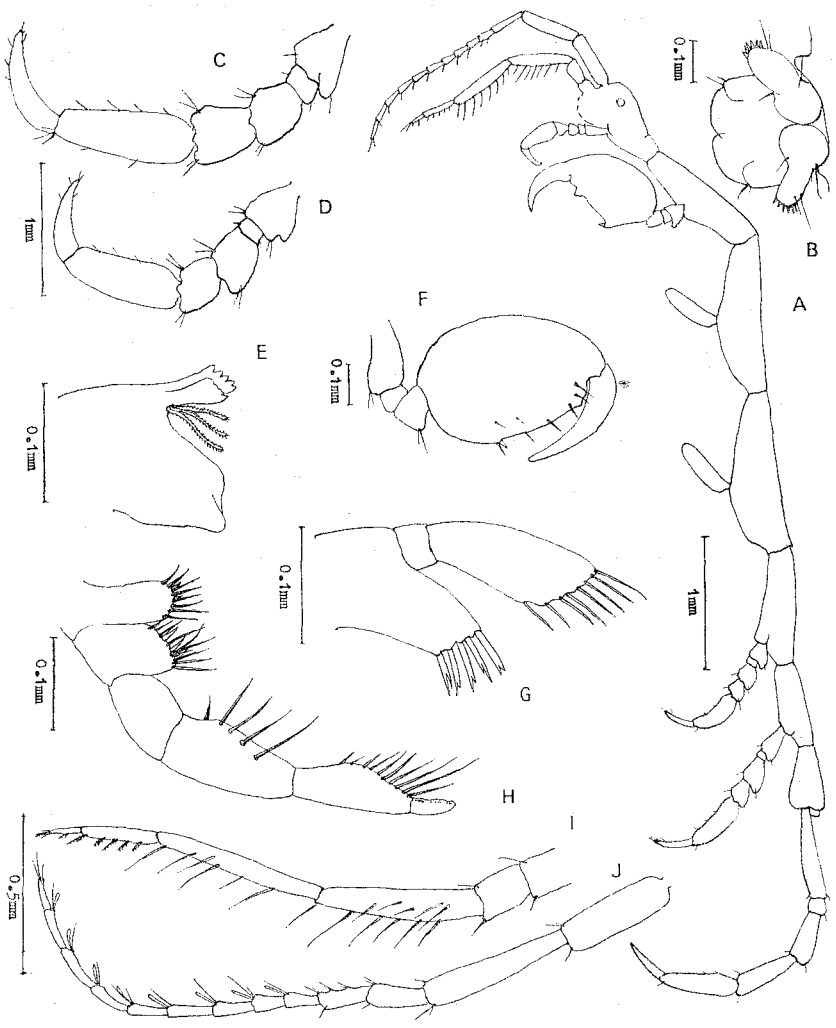

Fig. 32. *Caprella* (*Caprella*) *okadai* Arimoto.
A, adult male; B, abdomen of male; C, pereopod 6; D, pereopod 5; E, mandible; F, propodus of gnathopod 2 of young male; G, maxilla 1; H, maxilliped; I, antenna 2; J, antenna 1 (Arimoto, 1930).

DISTRIBUTION: Type locality: Tateyama Bay.

NOTES: Segment 4 of palp of maxilliped very small and short like in *Caprella japonica*, and not sharp distally, but penes not so long as those in the latter.

22. *Caprella (Caprella) decipiens* Mayer, 1890

(Jap. name: *Magire-warekara* Utinomi, 1968)

Figs. 33, 34, 35.

Caprella decipiens Mayer, 1890, Fauna Flora Golf. Neapel, 17: 86–87, pl. 7 figs. 37–40. ——Arimoto, 1930, Journ. Tokyo nat. Hist. Soc., 28 (39): 51–52, fig. 6. ——Hiro (=Utinomi) 1937, Annot. Zool. Japon., 16 (4): 313, pl. 22 fig. 7. ——Utinomi, 1947, Seibutsu (suppl.), 1: 73. ——Hirosaki, 1964, Misc. Rep. Res. Inst. Nat. Resources, 62: 68. ——Sando, 1964, Bull. Mar. Biol. Sta. Asamushi, 12 (1): 31. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14. ——Utinomi, 1968, Publ. Seto mar. biol. Lab., 16 (4): 286. ——Utinomi, 1969, Publ. Seto mar. biol. Lab., 16 (5): 299–300, fig. 3. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 17. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 15. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 33.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Apr. 4, 1927, 1 male, 1 female, attached to *Sargassum*, Coll. no. 3; Aug. 18, 1928, 3 males, 2 females, Coll. no. 23, 1 male, Coll. no. 29, Aug. 21, 1928, many males and females, Coll. no. 68; Hachijo-shima, collected by T. Fujita, Jul. 3, 1929, 1 male, Coll. no. 90; Otomi Bay, Fukui, collected by Tohru Yasuda, Apr. 30, 1968, depth 5 meters, 1 male, Coll. no. 269; Toyoda, Sado Island, collected by Kitami and Arimoto, May 3, 1970, 3 males, Coll. no. 618; Off Futami, Sado Island, collected by Kitami and Arimoto, May 5, 1970, 3 males, 1 female, Coll. no. 632; Tassha Bay, Sado Island, collected by Kitami and Arimoto, May 4, 1970, 5 males, 4 females, Coll. no. 392.

DESCRIPTION: Male: Body length of adult specimen 11.5 mm (Text-fig. 33, A); smooth, elongate; pereonite III longest of all segments, IV shorter than III, II a little shorter than IV, V a little shorter than III, VI and VII taken together a little shorter than II, I shorter than head; head rounded or slightly oval.

Antenna 1 shorter than half of body length, and segment 2 of peduncle a little longer than half of length of peduncle and very stout distally, segment 3 of peduncle very short and rather plump distally, flagellum, 11-segmented; antenna 2 shorter than peduncle of antenna 1, its flagellum 2-segmented with swimming setae. Gnathopod 2 attached to rather front of middle of pereonite II, basal segment shorter than half of pereonite II, propodus oblong, slightly shorter than three-times of its greatest breadth, at base of palm a long palmar spine on proximal projection, and 2 subpalmar spines at a distance from base about three-fourth of its total length, with a poison tooth, distal angle of palm with triangular tooth, but in the case of old males, its propodus of gnathopod 2 very long, more than four-times as long as its greatest breadth, a palmar spine and two subpalmar spines nearly on middle, poison tooth distally, distal angle of palm with triangular tooth, dactylus strong; pereopod 5 a little shorter than pereonite V, propodus without palmar spine, se-

veral delicate setose areas on inner margin, but outer margin with group of slender spines at 4 points, pereopod 6 a little longer than 5, pereopod 7 longest, and a little shorter than twice of pereopod 5.

Gills elongate; penes medial.

Female: Body length of adult specimen 12.5 mm (Text-fig. 34, A); pereonites III, IV and V subequal in length, VI a little longer than half of V, VII a little shorter than VI, and I a little shorter than head; flagellum of antenna 1, 11-segmented;

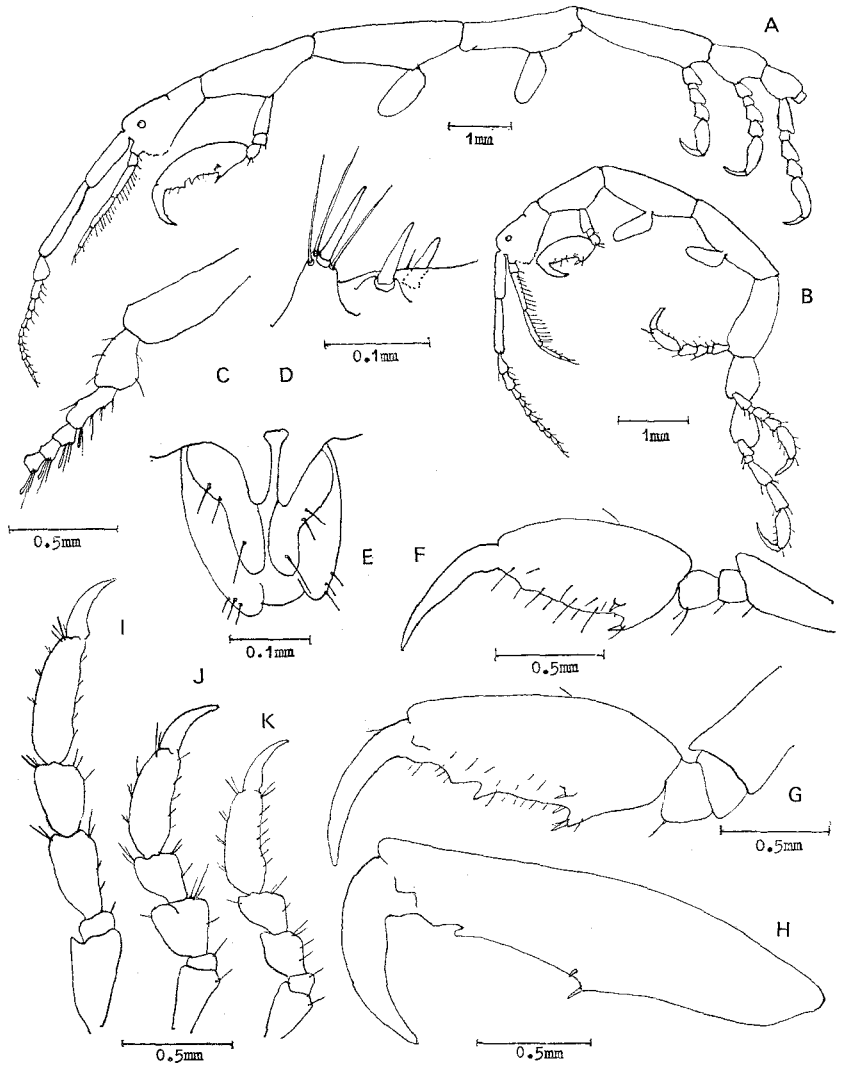

Fig. 33. *Caprella* (*Caprella*) *decipiens* Mayer.
A, adult male (material from Tassha Bay, Coll. no. 329); B, young male (material from Otomi Bay, Coll. no. 267); C, segment 3 of peduncle of antenna 1; D, palmar spines of gnathopod 2; E, abdomen of male; F, G and H, propodus of gnathopod 2 in males, young, adult and old; I, pereopod 7; J, pereopod 6; pereopod 5.

gnathopod 2 attached to rather front part of pereonite II, propodus tapering distally, palmar spine and subpalmar spines proximally, poison tooth and triangular tooth absent, and several spines along inner margin.

GROWTH: Male: Body length of young specimen 7.6 mm (Text-fig. 32, B); pereonites III and IV subequal in length and longer than other segment, pereonite V a little shorter than IV, II a little shorter than V, VI a little shorter than II, VII a little shorter than VI, I about half as long as head. Flagellum of antenna 1, 9-segmented; antenna 2 about equal in length to peduncle of antenna 1; gnathopod 2 attached to middle of pereonite II, propodus about twice as long as greatest breadth and tapering distally, a palmar spine and two subpalmar spines located at base,

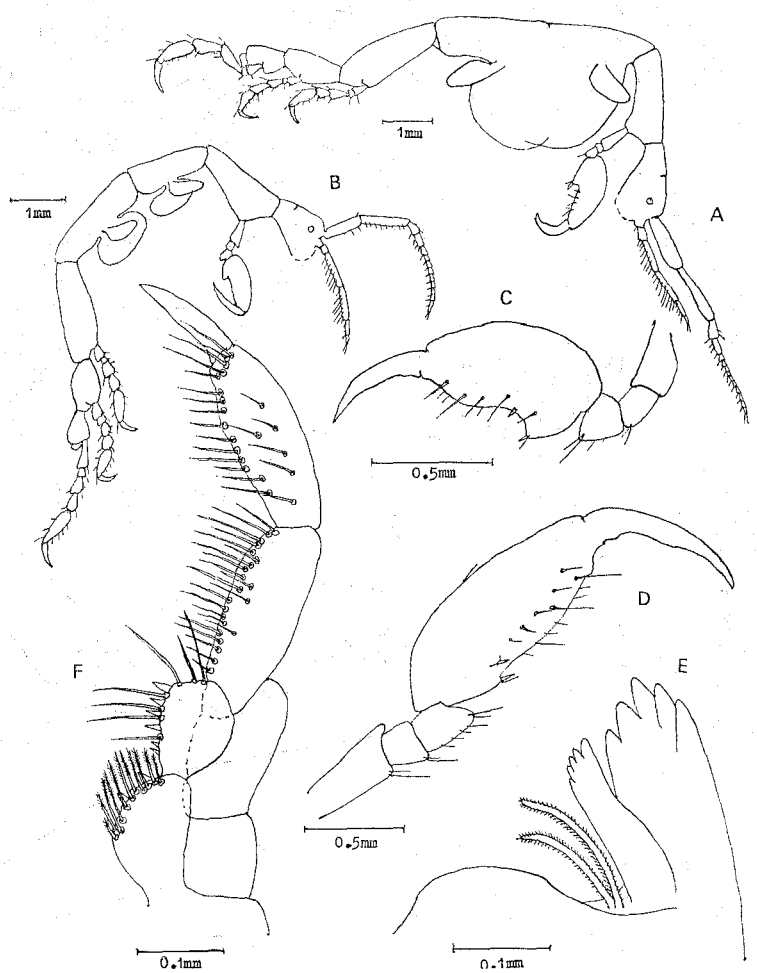

Fig. 34. *Caprella (Caprella) decipiens* Mayer.
A, adult female (material from Tassha Bay, Niigata Pref., Coll. no. 392); B, young female (ditto); C, propodus of gnathopod 2 of young female; D, propodus of adult female; E, mandible; F, maxilliped.

poison tooth absent, triangular tooth very small, and several small spines fringed on palmar margin; incisor of mandible divided into 5 large unequal teeth, lacinia mobilis much smaller than incisor, with its distal edge cut into 5 denticles; inner lobe of maxilliped carrying two distant spine teeth and feathered spines planted on apical and inner margin, outer lobe about equal to inner lobe in length, extending a little beyond segment 1 of palp, with 6 rather long spine teeth arranged straightly, and several long spines apically and on inner margin, segment 1 of palp shorter than 2, which is the longest of all segments and its inner margin fringed with long spines, segment 3 a little shorter than 2, with several long spines on inner margin, and terminal segment of palp sharp.

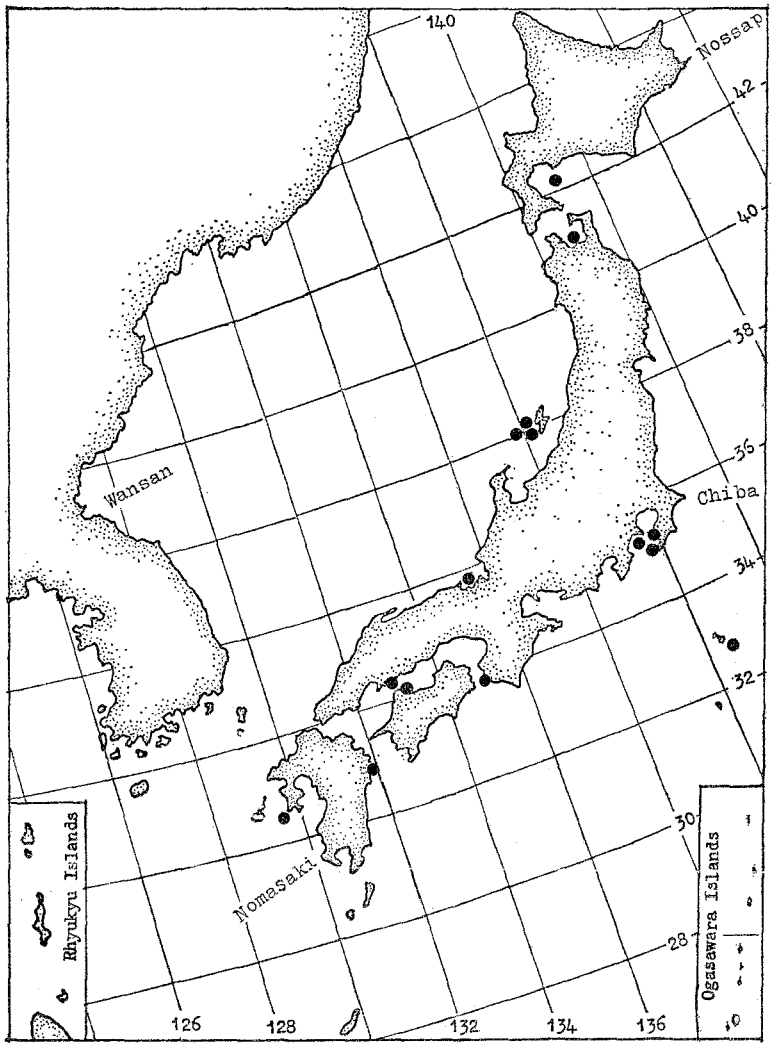

Fig. 35. Distribution records of *Caprella* (*Caprella*) *decipiens* Mayer around Japan.

Female: Body length of young specimen 10 mm (Text-fig. 34, B); pereonite IV longer than any other segment, V a little shorter than IV, II and III subequal in length and a little shorter than V; flagellum of antenna 1, 11-segmented; antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached to rather front part of pereonite II, propodus tapering proximally and distally, more than twice as long as its greatest breadth, a palmar spine and two subpalmar spines at base of palm, palmar margin slightly convex with several short spines on inner margin and near surface, and oostegites of pereonites III and IV still undeveloped.

DISTRIBUTION: Type locality: Kadsiyama (=Katsuyama).

Other localities around Japan and adjacent waters: Katsuyama (Mayer, 1890: 86); Tateyama Bay (Arimoto, 1930: 51); Tanabe Bay (Hiro=Utinomi; 1937: 313); Mukaijima, Hiroshima Pref. (Utinomi, 1947: 73); Tomioka Kumamoto Pref. (Utinomi, 1947: 73); Sagami Bay (Hirosaki, 1964: 68); Aomori Bay (Sando, 1964: 31); Kamae Bay (Utinomi, 1969: 297); Tassha, Sado Island (Arimoto, 1970, Coll. no. 392); S. tip of Sakhalin (McCain, 1970: 17); Off Futami, Sado Island (Arimoto, 1970, Coll. no. 632); Muroran (Arimoto, 1971: 15); Hachijojima (Arimoto, 1971: 15); Otomi Bay (Arimoto, 1971: 15); Kurushima Strait, Seto Inland Sea (Utinomi, 1973: 33).

Other collections: Tateyama Bay (Arimoto, 1928, Coll. nos. 23, 29 and 68); Tanabe Bay (Utinomi, 1968: 286).

23. *Caprella (Caprella) laevis* (Schurin), 1935

(Jap. name: *Sunachi-warekara* Arimoto, 1971)

Fig. 36.

Haploarthron laeve Schurin, 1935, Zool. Anz., 112 (7–8): 202–203, figs. 3–4. ——Schurin, 1937, Explor. Mers USSR, 23: 30–32, 36–37, figs. 11–12.

Caprella laeve Utinomi, 1947, Seibutsu (suppl.), 1: 74. ——Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 223–225, fig. 20. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 18.

Caprella laevis McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 25.

No specimen in the author's collection.

DESCRIPTION: Reproduced from the original description by Schurin (1935: 202–203).

Male: Body slender; pereonite V very much longer than any other pereonite, II, III and IV subequal in length, and a little longer than half of V, and I very short.

Antenna 1 about one-third of body in length, its flagellum, 6-segmented; antenna 2 a little shorter than antenna 1; gnathopod 2 attached to rear part of pereonite II, propodus oval in shape, palmar spine present proximally, and palmar margin slightly convex with several spines; pereopods 5 to 7 increasing in length, its propodus the longest of all segments of pereopods, and no palmar spines.

Body length of Vassilenko's specimen 5.5 mm

DISTRIBUTION: Type locality: Peter the Great Bay.

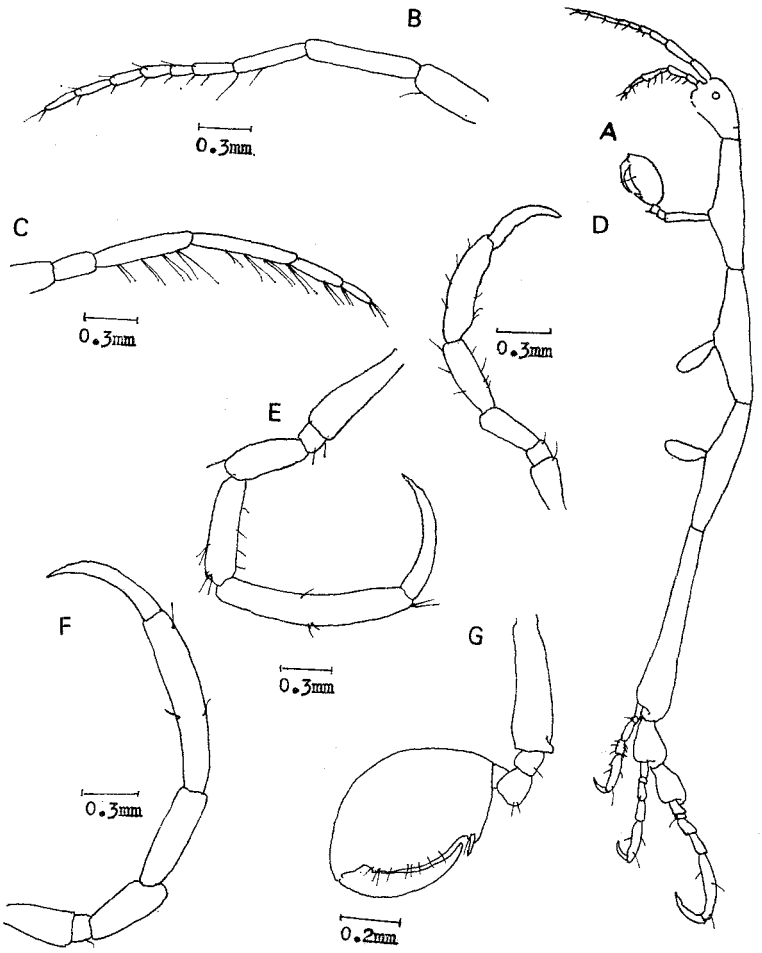

Fig. 36. *Caprella* (*Caprella*) *laevis* (Schurin).
A, adult male (after Schurin); B, antenna 1; C, antenna 2; D, pereopod 5; E, pereopod 6; F, pereopod 7; G, gnathopod 2 (B-G, after Vassilenko).

24. *Caprella* (*Caprella*) *mixta* Mayer, 1903

(Jap. name: *Mazari-warekara* Arimoto, 1971)

Fig. 37.

Caprella mixta Mayer, 1903, Siboga Exped. Mon., 34: 115–116, pl. 5 fig. 4. ——Utinomi, 1947, Seibutsu (suppl.), 1: 75. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 31. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 18.

No specimen in the author's collection.

OCCURRENCE: Vladivostok, collected by Slunin, 2 males and 2 females (Mayer, 1903: 115).

DESCRIPTION: Reproduced from Mayer's description (1903).

Male: Body length of adult specimen 12 mm (Text-fig. 37); smooth and

slender; pereonite II longer than any other segment, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, VI and VII taken together a little shorter than V, and I a little longer than head.

Antenna 1 longer than half of body length, flagellum very short, subequal to segment 1 of peduncle, and 11-segmented; antenna 2 subequal segment 3 of peduncle of antenna 1, with few setae; gnathopod 2 attached to middle part of pereonite II, segment 1 a little longer than half of pereonite II, propodus longer than segment 1 and more than four-times as long as its greatest breadth, at median of palm, there is a grasping spine, at distal angle of palm a triangular tooth, poison tooth situated near triangular tooth; pereopod 5 a little shorter than pereonite V, its propodus without palmar spines, 6 a little longer than 5, 7 a little longer than 6, and without palmar spines; gills elongate.

Female: Body length 8 mm; smooth; palmar margin of propodus of gnathopod 2 very even, but with a palmar spine; flagellum of antenna 1, 10-segmented.

DISTRIBUTION: Type locality: Vladivostok.

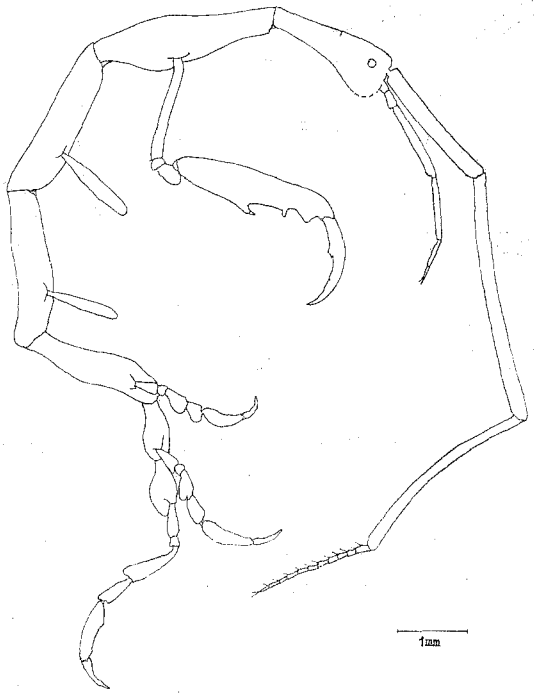

Fig. 37. *Caprella* (*Caprella*) *mixta* Mayer, adult male (after Mayer).

25. *Caprella* (*Caprella*) *gracillima* Mayer, 1890

(Jap. name: *Higehosonaga-warekara* Arimoto, 1971)

Figs. 38, 40.

Caprella gracillima Mayer, 1890, Fauna Flora Golf. Neapel, 17: 83, pl. 2 fig. 25. ——Mayer, 1903,

Siboga Exped. Mon., 34: 103-104, ——Utinomi, 1947, Seibutsu (suppl.), 1: 74. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 23. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 17.

No specimen in the author's collection.

OCCURRENCE: 42° N., 130°30′ E., 109.8 meters, collected by Suenson, Nov. 15, 1881, 2 females; Tsugaru Straits (41° N.), 182.9 meters, collected by Suenson in 1882, 1 female (Mayer, 1890: 83).

DESCRIPTION: After Mayer, 1890: 83.

Female: Body length of adult specimen 20 mm (Text-fig. 38); elongate and smooth; pereonite II longer than any other, V about two-thirds as long as II, III shorter than V, I a little shorter than III, IV a little shorter than I, VI a little shorter than IV, VII a little shorter than VI, head smoothly rounded above, not pointed at fore end.

Antenna 1 very long, a little shorter than body length, and becomes thin, its flagellum subequal to peduncle in length and composed of 22 segments; antenna 2 a little shorter than peduncle of antenna 1, with swimming setae; gnathopod 2

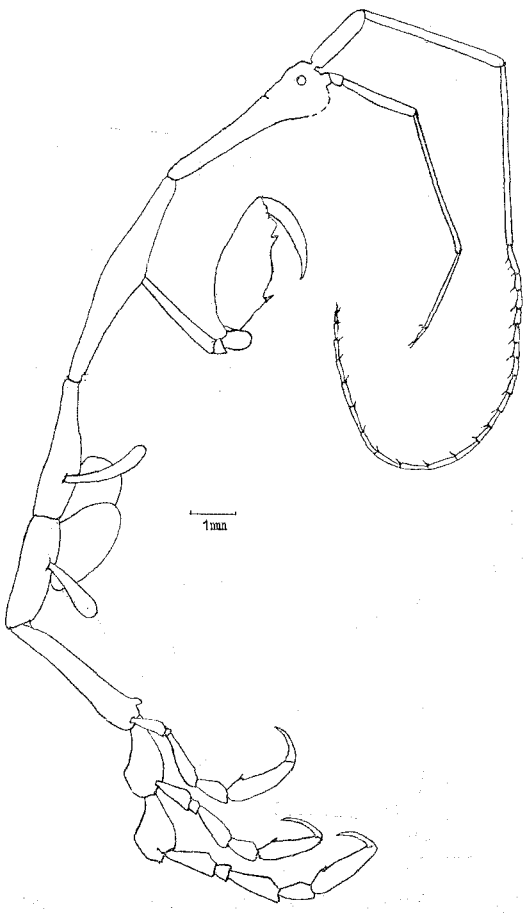

Fig. 38. *Caprella* (*Caprella*) *gracillima* Mayer, female (after Mayer).

attached to middle of pereonite II, segment 1 half length of pereonite II, propodus a little longer than segment 1 and more than twice as long as its greatest breadth, setiferous and with a palmar spine, triangular tooth at distal angle of palm, poison tooth nearly triangular with a narrow notch; pereopod 5 a little longer than pereonite II and its propodus longer than any other segment of pereopod 5, with palmar spines, pereopod 6 a little longer than 5, 7 a little longer than 6; gills long and linear.

DISTRIBUTION: Type localities: Tsugaru Straits and 42° N., 130°30′ E. (north of Korea), depth 109.7–182.9 meters.

Other locality around Japan: Off Tokyo (Mayer, 1903; 103).

26. *Caprella (Caprella) subtilis* Mayer, 1903

(Jap. name: *Hosonaga-warekara* Arimoto, 1971)

Figs. 39, 40.

Caprella subtilis Mayer, 1903, Siboga Exped. Mon., 34: 126, pl. 5 fig. 32, pl. 8 fig. 27. ——Utinomi, 1947, Seibutsu (suppl.), 1: 78. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 42. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 46. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 36.

No specimen in the author's collection.

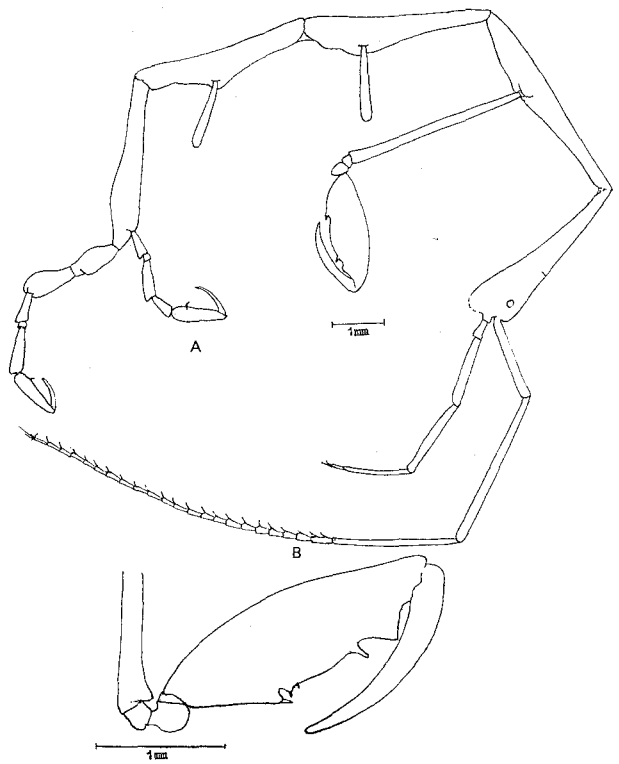

Fig. 39. *Caprella (Caprella) subtilis* Mayer (after Mayer).
A, adult male; B, propodus of gnathopod 2 of male.

OCCURRENCE: 38°30′ N., 128°35′ E., 146.3–182.9 meters, collected by Suenson in 1900, 1 male (Mayer, 1903: 126).

DESCRIPTION: After Mayer 1903: 126. Male: Body length of adult specimen 21 mm (Text-fig. 39), very elongate and smooth; pereonite II longer than any other, III shorter than II, IV a little shorter than III, V a little shorter than IV, I about twice as long as head, pereonites VI and VII taken together a little shorter than I.

Antenna 1 about two-thirds as long as body length, flagellum a little shorter than its peduncle and consists of 22 segments; antenna 2 a little shorter than peduncle of antenna 1 and becomes thin, without swimming setae; gnathopod 2 attached to rather rear part of pereonite II, segment 1 a little shorter than pereonite II, propodus

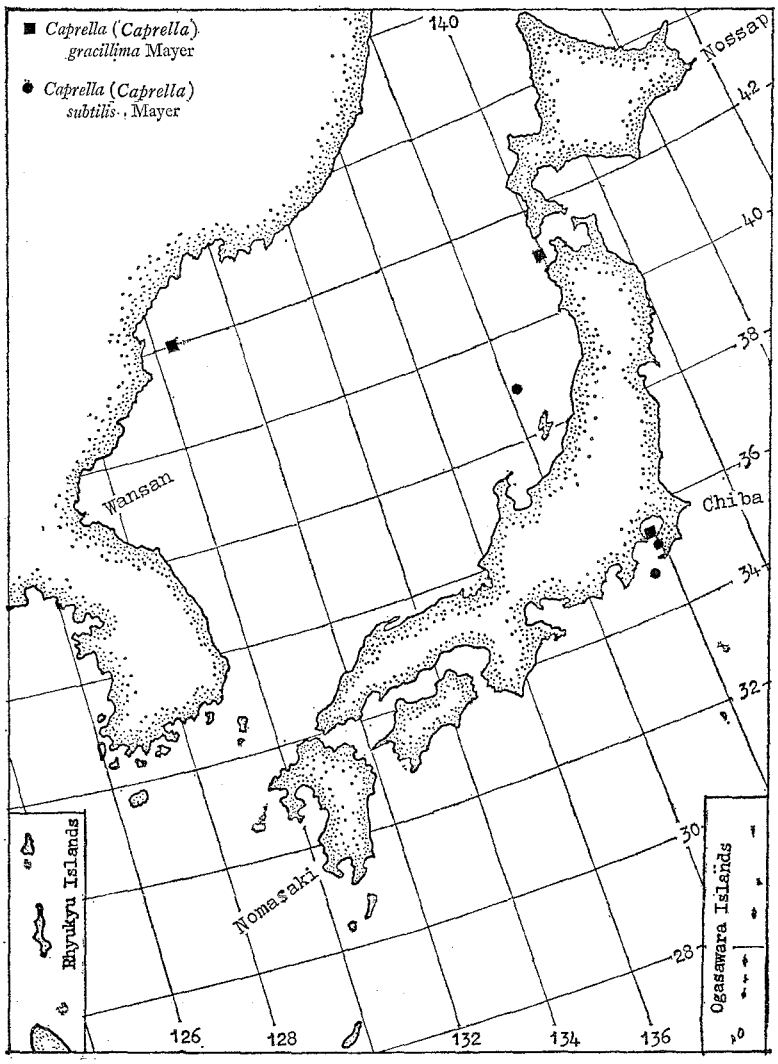

Fig. 40. Distribution records of *Caprella* (*Caprella*) *gracillima* Mayer nad *Caprella* (*Caprella*) *subtilis* Mayer, around Japan.

a little longer than segment 1 and about three-times as long as its greatest breadth, a palmer spine and a pair of subpalmar spines at base of palm, a large triangular tooth at distal angle of palm, poison tooth situated nearly triangular with a narrow notch; pereopods 5 and 7 slender and quite alike in shape and in length.

Gills long and linear, on pereonites III and IV.

DISTRIBUTION: Type locality: West of the Japan Sea (38°30′ N., 128°35′ E.), 146.3–182.9 meters.

Other localities around Japan: Off Izu-oshima, Sagami Bay (Utinomi, 1973: 36); Okinoyama, east of Sagami Bay (Utinomi, 1973: 36).

27. *Caprella (Caprella) iniquilibra* Mayer, 1903

(Jap. name: *Onaga-warekara* Arimoto, 1971)

Figs. 41, 42.

Caprella iniquilibra Mayer, 1903, Siboga Exped. Mon., 34: 105, pl. 4 figs. 17–19. ——Utinomi, 1947, Seibutsu (suppl.), 1: 74. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 24. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 17.

No specimen in the author's collection.

OCCURRENCE: 34°15′ N., 128°51′ E., 45.8 meters, collected by Petersen in Apr. 1893, young male; 33° N., 129°24′ E., 54.9 meters, collected by Schonau, May 26, 1894, 2 males and 1 female; Korean Straits, 91.5 meters, collected by Suenson, Jan. 12, 1898, 1 female (Mayer, 1903).

DESCRIPTION: Reproduced from Mayer's description 1903. Male: Body length of adult specimen 11 mm (Text-fig. 41); pereonite II longer than any other, V a little shorter than II, III a little shorter than V, IV a little shorter than III, I a little shorter than IV, VI and VII taken together subequal to I; pereonites I and III-VII smooth elongate, but pereonite II armed with a triangular tooth on ventral side medially, like in *C. equilibra*.

Antenna 1 a little longer than half of body length, flagellum 16-segmented; antenna 2 shorter than peduncle of antenna 1, and with swimming setae; gnathopod 2 attached to rather rear part of pereonite II, segment 1 a little shorter than half of pereonite II, propodus a little longer than segment 1 and about 1.5 times as long as its greatest breadth, which is equipped with a produced setiferous palmar spine, at distal angle of palm a large trinagular tooth, poison tooth situated nearly medially triangular with narrow notch; gills long and linear.

Female: Body length of adult specimen 9 mm (Text-fig. 41, C), smooth except pereonite II; flat and with a large ventral triangular tooth at pereonite II; pereonite II longer than any other, V a little shorter than II, IV a little shorter than V, III a little shorter than IV, III a little shorter than IV, VI and VII taken together a little shorter than V, I a little shorter than head.

Antenna 1 longer than half of body length, its flagellum 12-segmented; antenna 2 shorter than peduncle of antenna 1; gnathopod 2 attached to middle of pereonite

II, its segment 1 a little shorter than pereonite II, propodus a little longer than segment 1, and twice as long as its greatest breadth, which is produced, large triangular tooth at distal angle of palm, poison tooth situated nearly triangularly; gills long and linear.

Young male: Body length of specimen 6 mm (Text-fig. 41, B), smooth except pereonite II; pereonite V longer than any other, II a little shorter than V, III a little shorter than II, IV a little shorter than III, VI and VII taken together a little shorter than IV, I subequal to head; flat triangular ventral tooth of pereonite II very large.

Segment 1 of gnathopod 2 a little shorter than pereonite II, propodus a little longer than segment 1 and a little shorter than three-times of its greatest breadth, which has a small palmar spine at produced setiferous point, large triangular tooth at distal angle of palm, poison tooth situated near by triangular projection; gills long and linear.

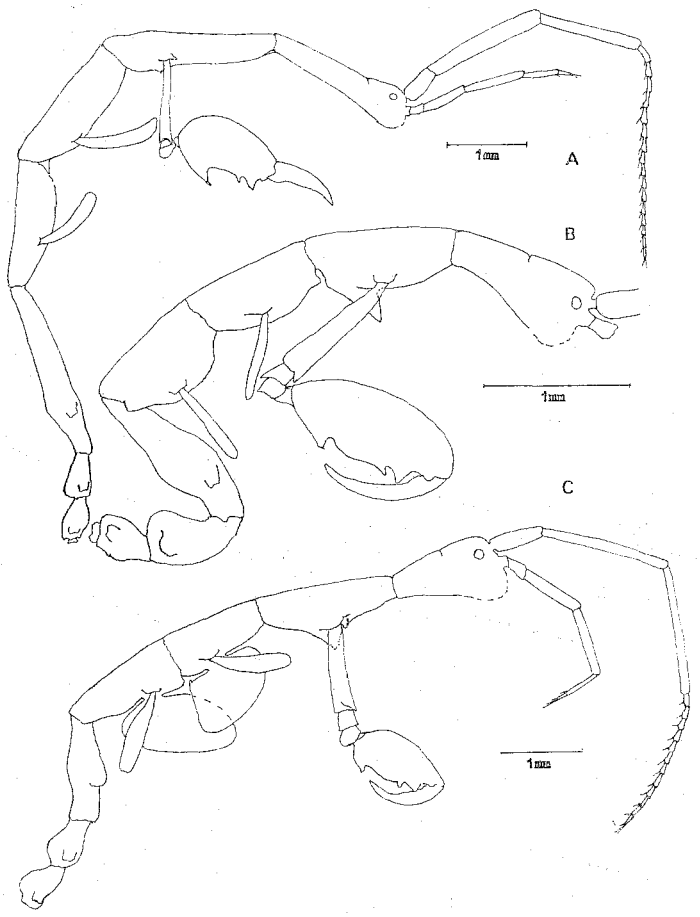

Fig. 41. *Caprella* (*Caprella*) *iniquilibra* Mayer (after Mayer).
A, adult male; B, young male; C, adult female.

DISTRIBUTION: Type localities: The Korean Straits, (34°15′ N., 128°51′ E.; 33°00′ N., 129°24′ E.; 33°10′ N., 129°18′ E.; 33°08′ N., 129°20′ E.), and the Formosa Straits, 45.7–91.5 meters.

Other locality around Japan and adjacent waters: The Korean Straits (Mayer, 1903: 105).

28. *Caprella (Caprella) simplex* Mayer, 1890

(Jap. name: *Chosen-warekara* Arimoto, 1971)

Fig. 43.

Caprella simplex Mayer, 1890, Fauna Flora Golf. Neapel, 17: 84–85, pl. 2 figs. 14–15, pl. 4 figs.

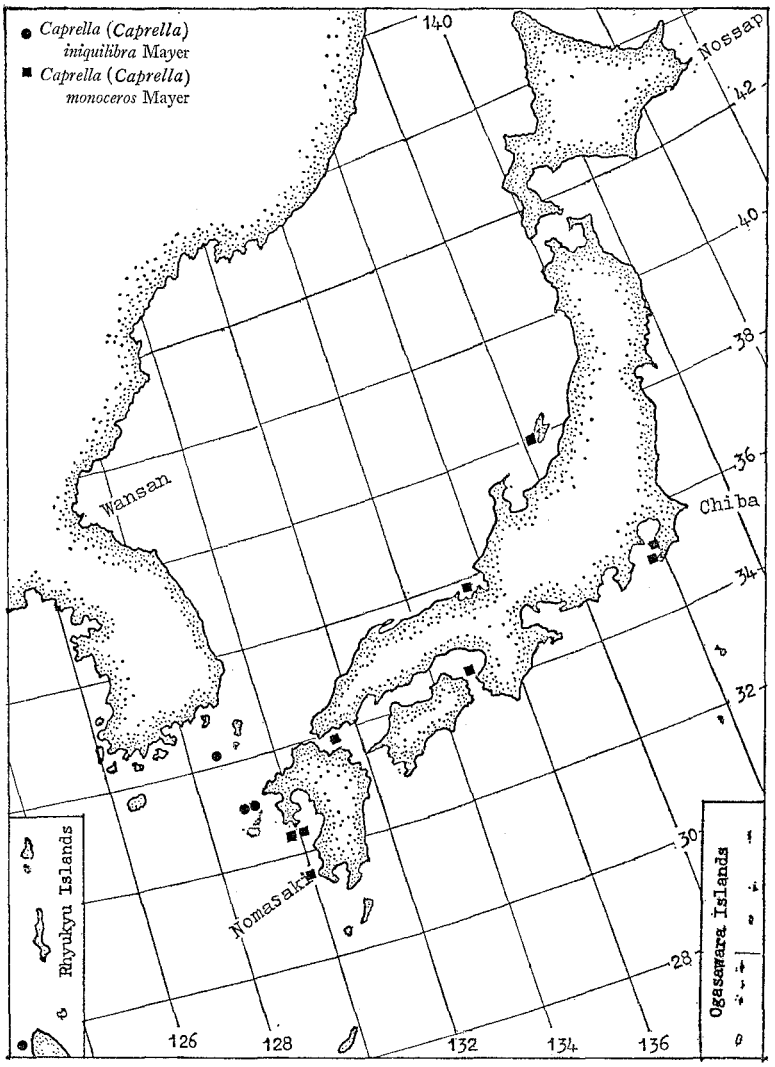

Fig. 42. Distribution records of *Caprella (Caprella) iniquilibra* Mayer and *Caprella (Caprella) monoceros* Mayer around Japan.

23–25. ——Utinomi, 1947, Seibutsu (suppl.), 1: 78. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 42. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 46.

No specimen in the author's collection.

OCCURRENCE: East coast of Korea, collected by Suenson in 1882 (Mayer, 1890: 84).

DESCRIPTION: Reproduced from Mayer's description 1890. Male: Body length of adult specimen 15 mm (Text-fig. 43, A); body smooth except pereonite V; pereonite II longer than any other, III a little shorter than II, IV a little shorter than III, V a little shorter than half of pereonite II, VI and VII taken together a little shorter than V, I a little longer than head; pereonite V armed with a pair of short sharp projections on anterior of back; antenna 1 subequal to body length, its flagellum 14-segmented; antenna 2 shorter than peduncle of antenna 1.

Gnathopod 2 attached to middle part of pereonite II, its segment 1 a little

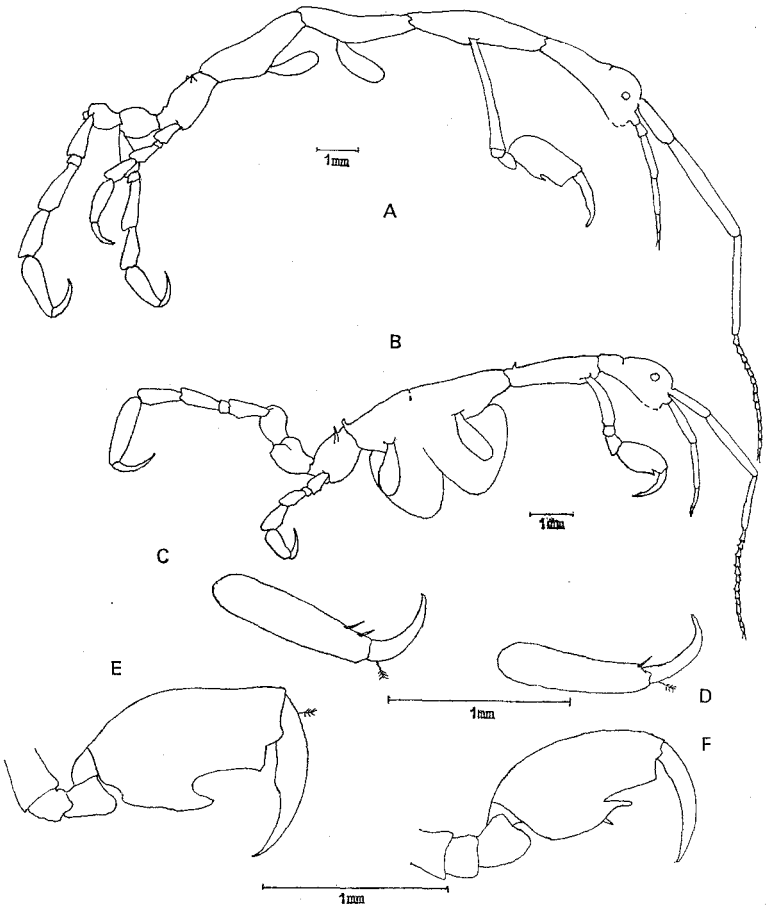

Fig. 43. *Caprella* (*Caprella*) *simplex* Mayer (after Mayer).
A, adult male; B, adult female; C, propodus of pereopod 7 of young male; D, propodus of pereopod 7 of young female; E, propodus of gnathopod 2 of male; F, propodus of gnathopod 2 of young male.

shorter than pereonite II, propodus a little longer than half of segment 1, and more than twice as long as its greatest breadth, median projection on palmar margin, at distal angle of palm a triangular tooth; pereopod 5 twice as long as pereonite V, pereopod 6 longer than 5, 7 longer than 6, these propodus bearing 1 or 2 spines at distal end of palmar margin, palmar spine absent; gills elongate.

Female: Body length of adult specimen 11 mm (Text-fig. 43, B); pereonites II and III subequal in length and longer than any other, IV a little shorter than III, V a little shorter than IV, VI and VII taken together a little shorter than II, I nearly as long as half of head; pereonite II and IV having at distal end unpaired spine dorsally, pereonite V with a pair of spines on anterior of back; flagellum of antenna 1, 13-segmented.

Gnathopod 2 attached to fore-end of pereonite II, its segment 1 a little shorter than pereonite II, propodus a little shorter than segment 1, poison tooth distally.

DISTRIBUTION: Type locality: East Korea, 54.9 meters.

Other locality in Japan and adjacent waters: East Korea (Mayer, 1890: 85).

29. *Caprella (Caprella) monoceros* Mayer, 1890

(Jap. name: *Mono-warekara* Utinomi, 1964)

Figs. 42, 44.

Caprella monoceros Mayer, 1890, Fauna Flora Golf. Neapel, 17: 87, pl. 7 fig. 32. ——Arimoto, 1931, Journ. Tokyo nat. Hist. Soc., 28 (41): 14–16, fig. 10. ——Utinomi, 1947, Seibustu (suppl.), 1: 75. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14, pl. 2 fig. 1. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 32. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 18. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 33.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Mar. 21, 1928, attached to *Sargassum*, 1 male, Coll. no. 41 (Text-fig. 42, A); Tateyama Bay, collected by Arimoto, Aug. 18, 1928, attached to *Sargassum*, many males and females, Coll. nos. 24 and 25 (Text-fig. 42, C and D); Inumi, Fukui Pref., collected by Tadashi Koba, Feb. 14, 1968, attached to raft for pearl culture, 2 males, Coll. no. 144 (Text-fig. 44, B).

DESCRIPTION: Male: Body length of adult specimen 11.5 mm (Text-fig. 44, A); pereonite II longer than any other, pereonites III and V subequal in length and a little shorter than II, IV a little shorter than III, VI and VII taken together a little shorter than V, I about twice as long as head; pereonites I, II, and III smooth, pereonite IV with a process inclining back-wards at distal end, pereonite V with a pair of projection upright on back, VI with a pair of projections rear of back.

Antenna 1 a little shorter than body length, its flagellum about one-third of peduncle in length and 12-segmented but segment 1 long and with eight setae; antenna 2 shorter than peduncle of antenna 1, with few setae; gnathopod 2 attached to rear part of pereonite II, its segment 1 a little longer than pereonite II, propodus about two-thirds as long as segment 1, and about five-times as long as greatest breadth, which has at distal angle of palm a triangular tooth, poison tooth situated nearly

triangular with narrow notch, fearthery spines on its all surface and fore part of segment 1; pereopod 5 a little longer than pereonite V, pereopod 6 a little longer than 5, 7 a little longer than 6, propodus with a pair of spines on inner margin, outer margin setules spines at 4 points. Gills elongate.

Female: Body length of adult specimen 7.7 mm (Text-fig. 44, D); pereonite II longer than any other, III a little shorter than II, V a little shorter than III, IV a little shorter than V, VI and VII taken together a little longer than V, I a little shorter than head; pereonite V with a pair of upright projections on back, but pereonites I, II, III, VI and VII smooth.

Antenna 1 a little shorter than body in length, flagellum 17-segmented, segment 1 with seven setae; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to rather front part of pereonite II, its segment 1 a little shorter than pereonite II, propodus a little longer than segment 1, and more than twice as long

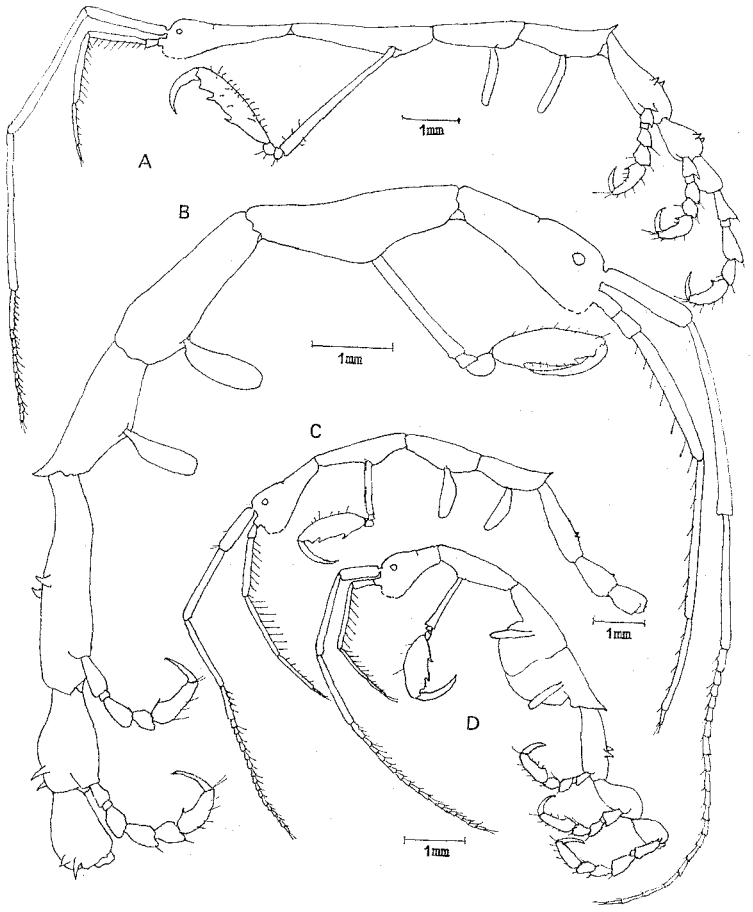

Fig. 44. *Caprella* (*Caprella*) *monoceros* Mayer.
A, adult male (material from Tateyama Bay, Coll. no. 41); B, young male (material Inumi, Fukui Pref., Coll. no. 144); C, young male (material from Tateyama Bay, Chiba Pref., Coll. no. 24); D, adult female (ditto, Coll. no. 25).

as greatest breadth, there are no fearthery spines on its surface.

GROWTH: Male: Body length of specimen 13.8 mm (Text-fig. 44, B); pereonites II and V subequal in length, and longer than any other, pereonite III a little shorter than II, IV a little shorter than III, VI and VII taken together a little longer than V, I about as long as head; pereonites I, II and III smooth, on median part of back of pereonite V with a pair of upright projections, pereonite VI with a pair of upright projections on end of back. Flagellum of antenna 1, 19-segmented, but its segment 1 with two setae; antenna 2, a little longer than peduncle of antenna 1; gnathopod 2 attached to middle of pereonite II, its segment 1 shorter than pereonite II, propodus a little shorter than segment 1, and a little shorter than three-times of its greatest breadth, with few fearthery spines.

Body length of young male 9 mm (Text-fig. 44, C); pereonite II longer than any other, V shorter than II, III a little shorter than V, IV a little shorter than III, VI and VII taken together a little shorter than V, I subequal to head; pereonite V and VI with a pair of small upright projections on back; flagellum of antenna 1, 17-segmented, but segment 1 with few setae; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to middle part of pereonite II, its basal segment about equal to pereonite II in length, propodus a little longer than segment 1.

DISTRIBUTION: Type locality: Kadsiyama (=Katsuyama).

Other localities around Japan: Awa-katsuyama (Mayer, 1890: 89); Tateyama Bay (Arimoto, 1931: 14); Tomioka (Utinomi, 1947: 75); Nomosaki, Kumamoto Pref. (Matsubayashi, 1962: 25–3); Off Futami, Sado Island (Kitami and Arimoto, 1970, Coll. no. 634); Wakasa Bay (Arimoto, 1971: 18); Awaji Island, Seto Inland Sea (Arimoto, 1971: 16); Off Aio-cho, Yamaguchi Pref. (Arimoto, 1971: 18); Endemic to Japan and the Japan Sea (Utinomi, 1973: 33).

Other collection: Tateyama Bay (Arimoto, 1928, Coll. nos. 25, 27, 28, 41, 50, 74).

30. *Caprella (Caprella) eximia* Mayer, 1890

(Jap. name: *Tsumebuto-warekara* Arimoto, 1971)

Fig. 45.

Caprella eximia Mayer, 1890, Fauna Flora Golf. Neapel, 17: 79, pl. 2 figs. 10–11. ——Mayer, 1903, Siboga Exped. Mon., 34: 101. ——Schurin, 1937, Explor. Mers USSR, 23: 24–25, figs. 1–2. ——Utinomi, 1947, Seibutsu (suppl.), 1: 74. ——Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 206–208, fig. 9. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 21. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 16.

OCCURRENCE: Coast of Korea, collected by Suenson in 1882, 100–183 meters; Tsugaru Straits 41° N., collected by Suenson in 1882, 183 meters, 2 females and 3 young; 37°02′ N., 129°31′ E., collected by Suenson in 1882, 55 meters, 2 females and young; Vladivostok, in 1967, 2 females (Mayer, 1903: 101).

No specimen in the author's collection.

DESCRIPTION: Reproduced from Mayer's description. Male: Body length

of specimen 27 mm (Text-fig. 45, A); slender and many projections on back; pereonite II longer than any other segment, IV a little shorter than II, III a little shorter than IV, I a little shorter than III, V a little shorter than I, VI and VII taken together a little shorter than V; head smooth, pereonite I long and smooth, pereonite II armed with two pairs of strong projections at rear part and end of back, and about five pairs of small dorsal projections between strong projections, pereonite III about 11–12 pairs of projections on back, pereonite IV armed with 14 pairs of dorsal projections, pereonite V with about 8 pairs of dorsal projections, pereonites VI and VII each with 3 pairs of dorsal projections.

Antenna 1 longer than half of body length, its flagellum as long as segment 2

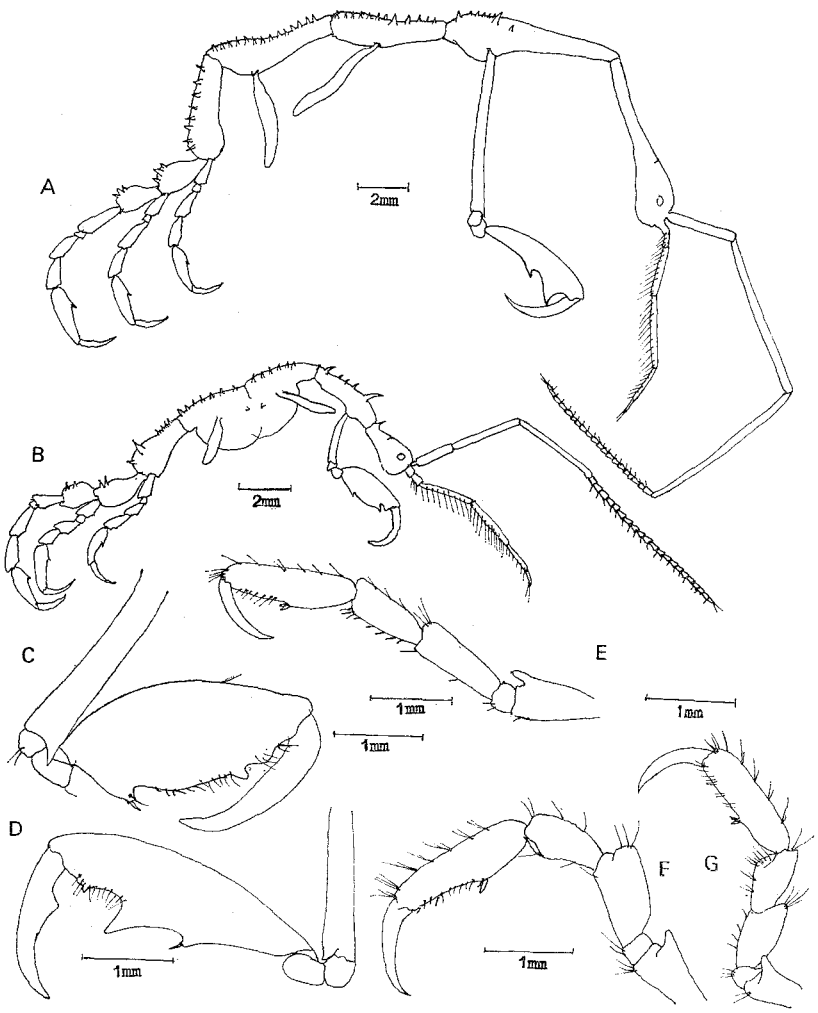

Fig. 45. *Caprella* (*Caprella*) *eximia* Mayer.
A, adult male; B, adult female; (A-B, after Mayer, 1890); C, gnathopod 2 of female; D, gnathopod 2 of male; E, pereopod 7; F, pereopod 6; G, pereopod 5; (C-G, after Vassilenko, 1967).

of peduncle of antenna 1, and composed of 28 segments; antenna 2 shorter than peduncle of antenna 1 and weakly setose; gnathopod 2 attached to rather rear part of pereonite II, its segment 1 a little shorter than pereonite II, propodus a little shorther than segment 1 in length and longer than twice its breadth, large poison tooth, proximally with a slight projection, palmar angle bearing a spine, a triangular tooth at distal angle of palm; pereopod 5 a little longer than pereonite V, of these segment 1 of pereopods has strong projection on outer corner of apex, propodus longest of all segments, and armed submedially with clasping spines, and several spines at palmar margin, outer margin with groups of slender spines at 6 or 7 points.

Female: Body length of specimen 16 mm (Text-fig. 45, B); pereonite II longer than any other segment, pereonites III and IV subequal in length, and a little shorter than II, V a little shorter than IV, VI and VII taken together a little longer than V, I a little shorter than head; head smooth, pereonite I armed with a pair of hook-like branched projections bent forward at hind end of back, pereonite II armed with two pairs of large projections on back, and having three pairs of small projections, pereonite III and IV with 6 or 7 pairs of projections on back, pereonite V with a pair of large projections and 3 or 4 pairs of small projections on back, pereonites VI and VII each with a pair of projections on back.

Antenna 1 a little shorter than body length, its flagellum a little shorter than its peduncle, and 20-segmented; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to rather front part of pereonite II, its segment 1 a little longer than half of pereonite II, propodus longer than segment 1 and more than twice as long as greatest breadth, which has produced setiferous palmar tooth, poison tooth situated near by triangular tooth at distal angle of palm, palm fringed with small spines. Gills elongate.

DISTRIBUTION: Type localities: Korean Sea, 109.2–182 meters (Mayer, 1890: 79); Tsugaru Straits, 182 meters (Mayer, 1890: 79); 37°2′ N., 129°31′ E., 54.6 meters; and Vladivostok (Mayer, 1890: 79).

Other records: Peter the Great Bay and Possjet Bay (Vassilenko, 1967: 206).

31. *Caprella (Caprella) kroyeri* De Haan, 1849

(Jap. name: *Oh-warekara* Utinomi, 1964)

Figs. 44, 47, 48.

Caprella Kröveri De Haan 1849, in Von Siebold, Fauna Japon., Crust.: 228–229, pl. 50 fig. 8. —— Herklots, 1861, Tijdschr. Entomol., 4: 43. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 70. —— Mayer, 1890, Fauna Flora Golf. Neapel, 17: 74–75, pl. 2 figs. 20–23, pl. 4 fig. 30, pl. 5 fig. 47, pl. 7 figs. 3, 8. ——Mayer, 1903, Siboga Exped. Mon., 34: 107–108, pl. 5 fig. 1, pl. 8 fig. 13. ——Miyadi and Masui, 1942, Occ. Pap. Japanese Occanogr., 2 (1): 10.

Caprella spinosa Lookington, 1874, Proc. California Aca. Sci., 5: 405–406, pl. 11. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 70. Type locality: Hakodate Bay, 16 meters.

Caprella kröyeri d' A.W. Thompson, 1901, Catal. Crust. Mus. Dundee: 41. ——Utinomi, 1943, Sci. Rep. Tohoku imp. Univ., (Biol. 4) 17 (3): 277–279, fig. 6. ——Utinomi, 1943, Sci. Rep. Tohoku imp. Univ., (Biol. 4) 17 (3): 284–285. ——Utinomi, 1947, Seibutsu (suppl.), 1: 74. ——Utinomi, 1958, Col. Illustr. seashore Anim. Japan: 56, pl. 27 fig. 15. ——Sando, 1964, Bull. mar. biol. Sta.

Asamushi, 12 (1): 31. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14, pl. 2 fig. 5, pl. 3 fig. 7. ——Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 209–210, fig. 10. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 11.

Caprella Kröyer Arimoto, 1931, Journ. Tokyo nat. Hist. Soc., 29 (41): 11–13, fig. 8.

Caprella kroyeri Kikuchi, 1966, Publ. Amakusa mar. biol. Lab., 1 (1): tab. 21. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 25. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 33.

OCCURRENCE: Tateyama Bay, collected by Asajiro Oka, Apr. 5, 1895, 1 male, 2 females, Coll. no. 44, collected by Arimoto, May 4, 1927, 1 male, Coll. no. 59;

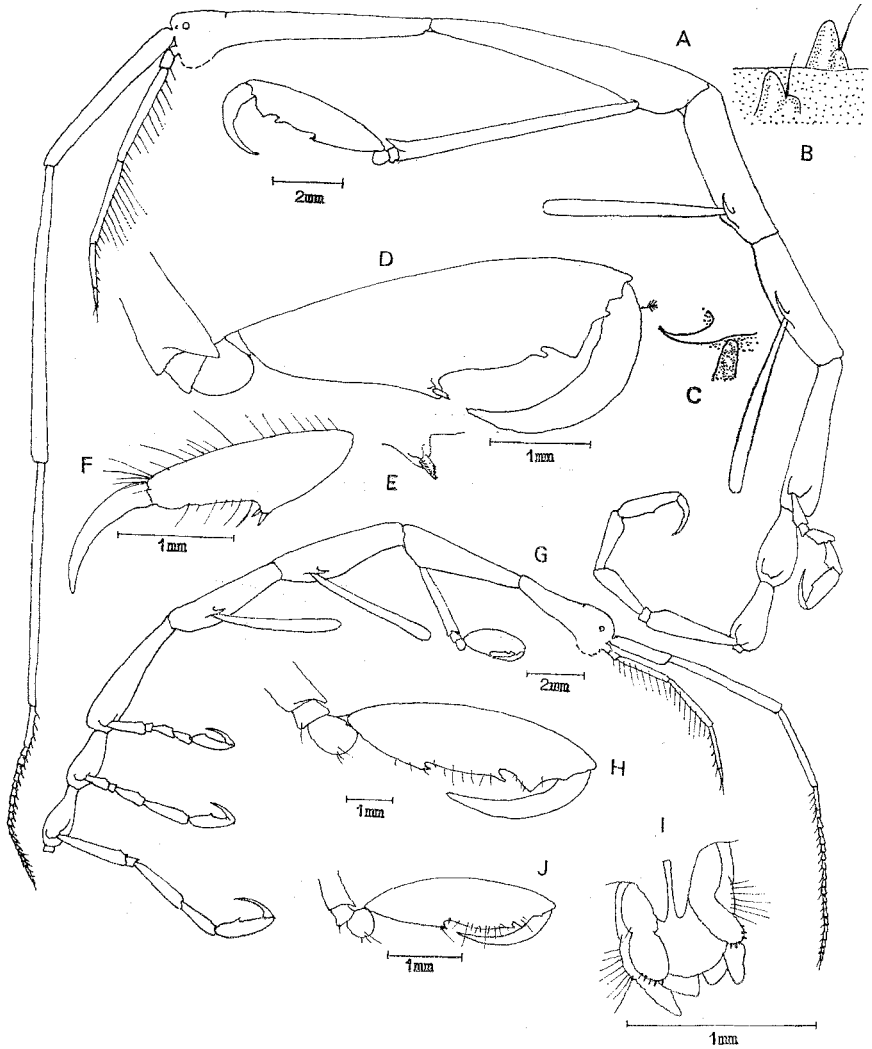

Fig. 46. *Caprella* (*Caprella*) *kroyeri* De Haan.
A, adult male (Arimoto, 1930); B, numerous granules; C, lateral spine above gill; D, propodus of gnathopod 2; E, palmar spine of propodus of gnathopod 2; F, propodus of pereopod 7; G, young male (material from Shiogama Bay, Miyagi Pref., Coll. no. 239); H, propodus of gnathopod 2 of male; I, abdomen of male: J, propodus of gnathopod 2 of male of 10 mm body length.

Tomioka Kanagawa, collected by Arimoto, Apr. 18, 1929, 1 male, Coll. no. 77; The Sea of Kumano, collected by Kiyomatsu Matsubara, May 15, 1936, Coll. no. 108; Off Shiogama, collected by Hideo Ohhara, 1968, attached to oyster farming rope, 8 males, Coll. nos. 238 and 239.

DESCRIPTION: Male: One of large-sized caprellids; body length of adult specimen 33 mm (Text-fig. 46, A); smooth and slender except pereonites III and IV; pereonite II longer than any other segment, pereonite I shorter than II, V shorter than I, III a little shorter than V, IV a little shorter than III, VI and VII taken together subequal to IV in length; body covered with numerous granules each bearing a sensor; head apparently smooth, though having a pair of minute tubercles between base of antenna 1 and eye, eyes rather large and prominent; pereonite I variable in length with age, each side of pereonites III and IV, with a sharp long projection bent foreward above point of articulation of gill, these projections constituting most characteristic features of this species.

Antenna 1 very long, a little shorter than body, segment 2 of peduncle longer than any other segment, segment 3 a little shorter than 2, 1 a little shorter than 3, flagellum a little longer than segment 1 of peduncle, and 6-segmented but basal segment of 5 not separate; antenna 2 very short, about one-third as long as peduncle of antenna 1 with swimming setae. Incisor of mandible divided into 5 large unequal

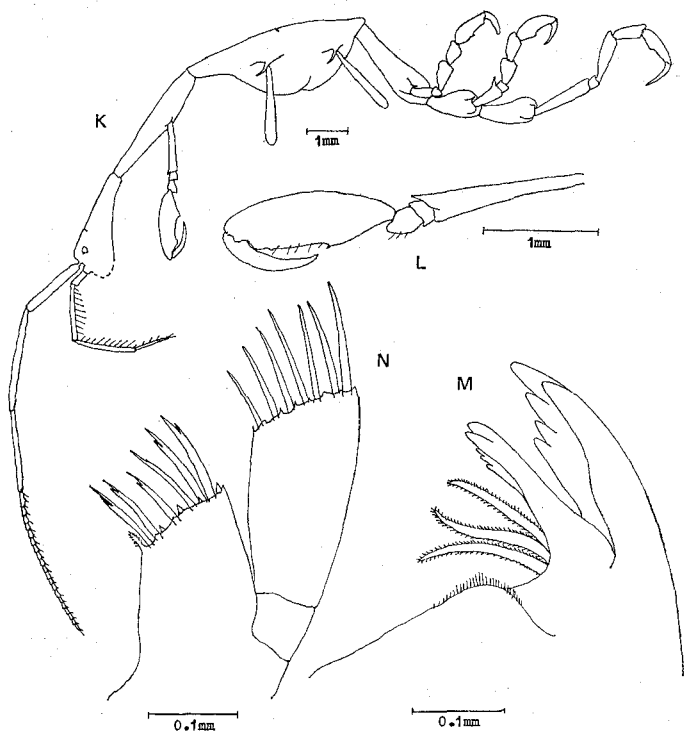

Fig. 47. *Caprella (Caprella) kroyeri* De Haan.
K, adult female (material from Tateyama Bay, Coll. no. 41); L, propodus of gnathopod 2 of adult female; M, mandible; N, maxilla 1.

teeth, lacinia mobilis divided into 5 teeth, setal row 2 or 3, molar projection slightly serrate; outer lobe of maxilla 1 with a few spine teeth apically, and 6 spines that are fork-like divided into two branches at apex, segment 1 of palp short, 2 longer than outer lobe, apical margin narrow, with 7 strong spines; gnathopod 2 attached to rather rear part of pereonite II, its segment 1 a little shorter than pereonite II, propodus a little longer than half of segment 1, and a little longer than twice as long as its greatest breadth, which is produced at middle part of palmar margin, and setiferous tooth, a triangular tooth at distal angle of palm, poison tooth small and situated near by triangular projection with narrow notch in between; pereopod 5 shortest of all pereopods, pereopod 7 rather shorter than twice of 5, propodus with a pair of dentate grasping spines proximally on palmar margin, and several setae,

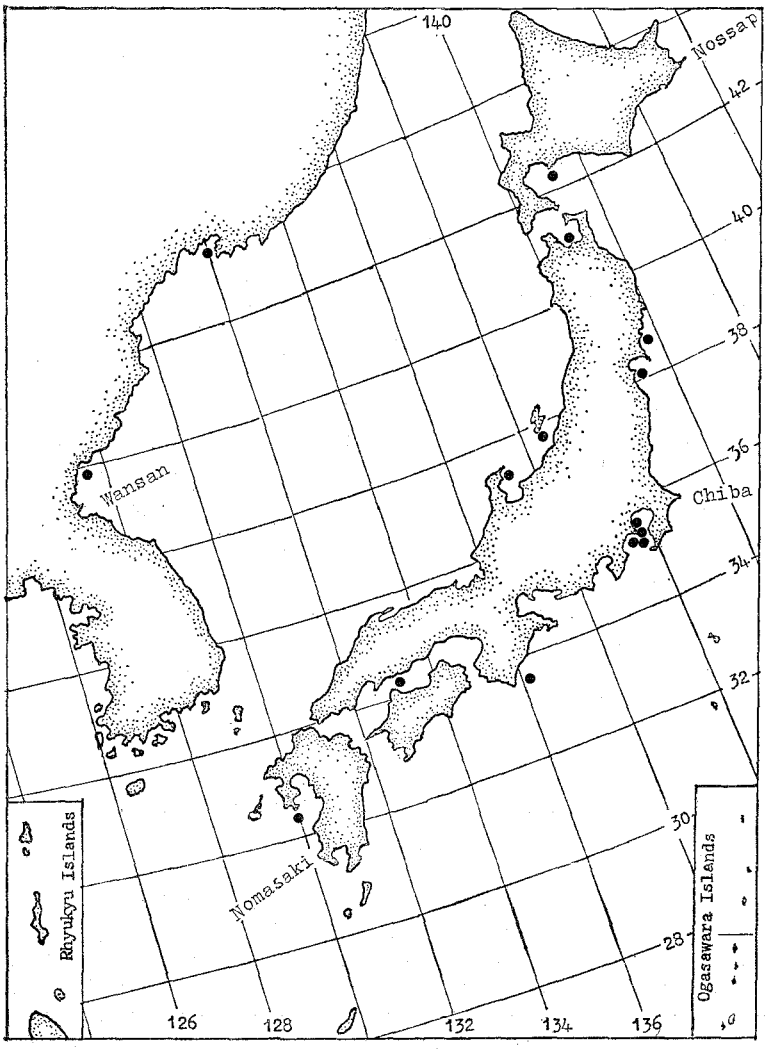

Fig. 48. Distribution records of *Caprella* (*Caprella*) *kroyeri* De Hann around Japan.

outer margin with slender spines at whole surface. Gills long and linear.

Female: Body length of adult specimen 14.5 mm (Text-fig. 47, K); pereonite II longer than any other segment, V shorter than II, III subequal to V, IV a little shorter than III, VI and VII taken together subequal to V, I a little shorter than IV. Antenna 1 about two-thirds as long as body length, flagellum a little shorter than two-thirds of peduncle of antenna 1, and 20-segmented; antenna 2 shorter than peduncle of antenna 1; gnathopod 2 attached to rather rear part of pereonite II, its segment 1 a little shorter than half of pereonite II, propodus a little longer than segment 1, and more than three-times of its greatest breadth, which at produced setiferous point has small tooth, several setae on palmar margin, triangular tooth small.

GROWTH: Male: Body length of young specimen 25 mm (Text-fig. 46, G); pereonites II, III and V subequal in length, IV a little shorter than III, VI and VII taken together subequal to V, I twice as long as head; flagellum of antenna 1, 20-segmented; propodus of gnathopod 2 short, more than four-times of its greatest breadth, which at produced setiferous point has small tooth, with several setae on palmar margin, in the case of male 10 mm in body length, propodus is more than three-times of its greatest breadth.

Abdomen, penes medial, appendages with many small acute spines around apex.

DISTRIBUTION: Type locality: Japan, not exactly cited (De Haan, 1849: 228).

Other localities around Japan and adjacent waters: Misaki (Mayer, 1890: 74); Hakodate (Lockington, 1875: 405; Mayer, 1903: 143); Vladivostok (Mayer, 1903: 405); Tateyama Bay (Mayer, 1903: 107); Ohmori, Tokyo (Mayer, 1903: 107); Japan Inland Sea (Mayer, 1903: 17); Asamushi (Utinomi, 1943: 284); Onagawa Bay (Utinomi, 1943: 227); Nanao Bay (Utinomi, 1947: 74); Tomioka (Utinomi, 1947: 74; 1964: 14); Possjet Bay (Vassilenko, 1967: 209); Niigata (Ito, 1970); Off Shiogama (Arimoto, 1971: 17); Kanazawa, Tomiura, Kanagawa (Arimoto, 1971: 18); Kumanonada (Arimoto, 1971: 18); Fukaura, West Coast of Aomori Pref. (Utinomi, 1973: 33); Kugurizaka, Aomori Bay (Utinomi, 1973: 33).

Other collection: Tomioka (Kikuchi, 1959: 21, 11; 1962: 29, IV; Utinomi, 1964: 14); Asamushi (Kunio Takahashi, Aug. 12, 1968, Coll no. 100).

32. *Caprella (Caprella) laeviuscula* Mayer, 1903

(Jap. name: *Futohanote-warekara* Arimoto, 1971)

Fig. 49.

Caprella laeviuscula Mayer, 1903, Siboga Exped. Mon., 34: 109, pl. 5 fig. 3, pl. 8 figs. 17–18. —— Utinomi, 1943, Journ. Fac. Soc. Hokkaido imp. Univ., 6, 8 (3): 291–292, fig. 7. ——Utinomi, 1947, Seibutsu (suppl.), 1: 74–75. ——Dougherty and Steinberg, 1953, Proc. biol. Soc. Washington, 66: 44, 47. ——Dougherty and Steinberg, 1954, in Light et al., Intertidal Invert. Centr. Calif. Coats: 170, 171. ——Cardella, 1962, Biol., 45 (1–2): 1, 3. ——Saunders, 1966, Crustaceana, 10 (3): 314–316. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 26. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 18.

No specimen in the author's collection.

OCCURRENCE: Bessyakucomari, in Akkeshi Bay, depth 4.5–5.4 meters, collected by M. Iwasa, July 31, 1933.

DESCRIPTION: Reproduced from Utinomi's description, 1943. Male: Body length of specimen 9.5 mm (Text-fig. 49); smooth, except for a ventrolateral tooth on each side situated at fore end of pereonites III and IV; pereonite II longer than any other, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, I a little shorter than V, VI and VII taken together a little longer than V. Antenna 1 short, moderately slender and about one-third of body length; antenna 2 a little shorter than peduncle of antenna 1 and with swimming setae; gnathopod 2 attached to a little behind the middle of pereonite II, segment 1 a little shorter than half of pereonite II, propodus with evenly convex front margin, poison tooth very large, strong, and medial, in position besides an accessory spine at base of poison tooth, palmar angle slightly projecting, and bearing a spine submedially, distal angle of palm triangularly projecting, and separated by a deep and wide median concavity from poison tooth, dactylus falciform, long with indented inner margin; pereopods 5–7 relatively long, clasping spines submedial of palm.

Gills oblong, about as long as segment 1 of gnathopod 2; penes medial; apical margin of abdominal appendage nude and curved to outside, abdominal lobe simple.

DISTRIBUTION. Type localities: Humboldt Bay, California; Chiniak Bay,

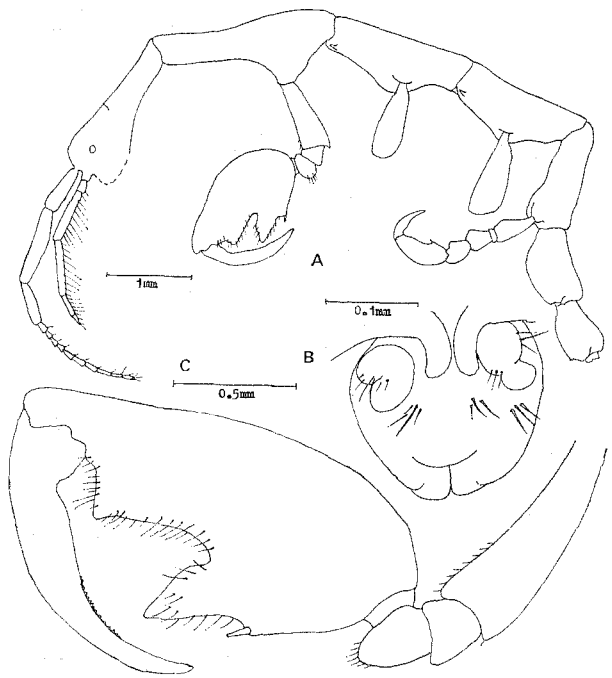

Fig. 49. *Caprella* (*Caprella*) *laeviuscula* Mayer (after Mayer).
A, adult male; B, abdomen of male; C, propodus of gnathopod 2 of male.

Adakh and Bay of Islands, Alaska; Victoria Harbor and Fort Rupert, British Columbia.

Other records: Monterey Bay, California; Friday Harbor, Washington.

Other locality around Japan: Akkeshi Bay (Utinomi, 1943: 291).

33. *Caprella (Caprella) imaii* Utinomi, 1943

(Jap. name: *Imai-warekara* Utinomi, 1971)

Fig. 50.

Caprella imaii Utinomi, 1943, Sci. Rep. Tohoku imp. Univ., (Biol. 4) 17 (3): 276-277, figs. 4–5. ——Utinomi, 1947, Seibutsu (suppl.), 1: 74. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 24. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 17.

No specimen in the author's collection.

OCCURRENCE: Onagawa Bay, Izushima, Sept. 7, 1936, on submerged iron-

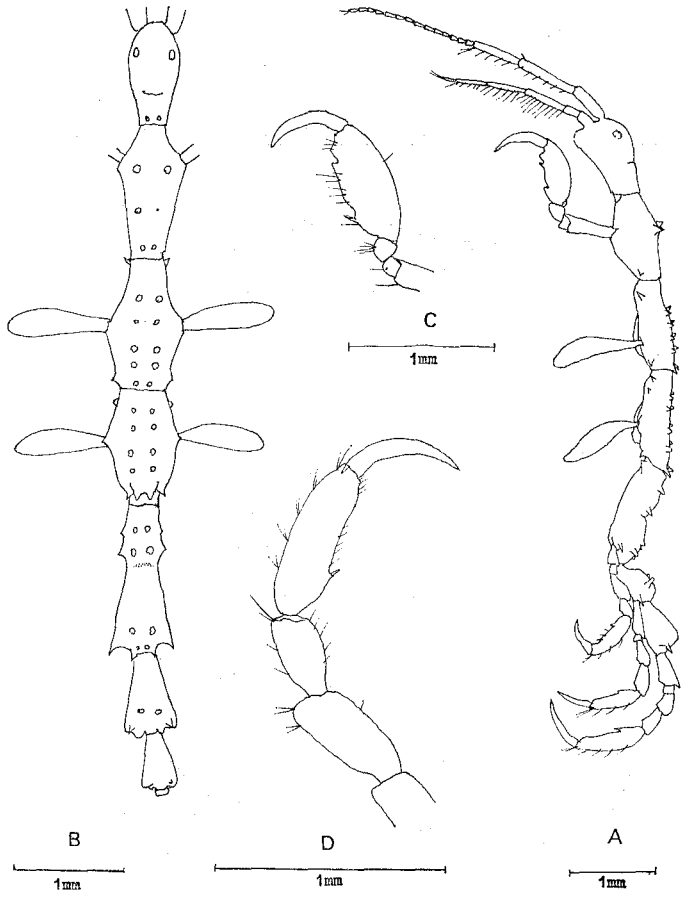

Fig. 50. *Caprella (Caprella) imaii* Utinomi (after Utinomi).
A, lateral view of male; B, dorsal view of male; C, gnathopod 2 of male; D, pereopod 7.

plates, 6 males, 2 females (Utinomi, 1943: 276).

DESCRIPTION: Reproduced from Utinomi's description, 1943.

Male: Body length 5–6 mm (Text-fig. 50); moderately slender and tuberculate; pereonite V longer than any other, pereonites III and IV subequal in length and a little shorter than V, II about as long as III, VI and VII taken together, and a little shorter than V, I shorter than head; head smooth, but often armed with a pair of minute dorsal tubercles; eye small; pereonite I with a pair of minute dorsal tubercles at hind end, pereonite II provided with 1 to 3 pairs of dorsal tubercles and with a ventro-lateral tubercles turned backwards at hind end, pereonite III and IV armed with 5 or 6 pairs of dorsal tubercles placed at same interval of which the last one at hind end of pereonite IV is somewhat sharply pointed backward, and also a ventro-lateral tubercle at fore and hind ends on each side, pereonite V divided dorsally by median transverse constriction into two parts, each part of which armed with one or two pairs of dorsal tubercles, a lateral tubercle present near fore end, pereonites VI and VII each with a pair of dorsal tubercles of which last one may sometimes be absent, and provided with an acute tooth above point of attachment of pereopods.

Antenna 1 slender and longer than half of body length, flagellum a little shorter than peduncle, and 12- to 14-segmented; antenna 2 longer than peduncle of antenna 1, setae on inner margin; gnathopod 2 attached to center of pereonite II, its segment 1 a little longer than half of pereonite II in length, propodus oblong, sparsely hairy, palm somewhat convex, proximally with a slightly projecting palmar angle bearing a spine, and somewhat distally a small poison tooth, separated by a narrow sinus from a broad distal projection; dactylus with slightly serrated inner margin.

Gills club-shaped, longer than stalk of gnathopod 2; pereopods 5–7 quite alike in outline, though pereopod 7 twice as long as pereopod 5, propodus cylindrical, about three-times as long as wide, and armed submedially with clasping spines, its outer margin with 5 clusters of bristles.

DISTRIBUTION: Type locality: Onagawa Bay.

Locality around Japan: Onagawa (Utinomi, 1943: 276–277).

34. *Caprella (Caprella) carinata* Arimoto, 1934

(Jap. name: *Baratoge-warekara* Arimoto, 1971)

Figs. 51, 52, 53.

Caprella carinata Arimoto, 1934, Dobutsu.-Zasshi, 46 (553): 496–501, fig. 1, pl. 1 figs. 3–11, pl. 2 figs. 3–5, pl. 3 figs. 2, 8, 17, 21, 22, 27. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 15. —— Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 14.

OCCURRENCE: Off Shiriyazaki, 37°00′ N., 141°10′ E., collected by T/S Sōyō-maru of Fisheries Experimental Station of Department of Agriculture and Forestry, Nov. 30, 1925, depth 132 meters, 1 male, (Text-fig. 51, F), St. 143, Coll. no. 502; Off Shizugawa 38°42′ N., 141°57′ E., collected by T/S Sōyō-maru of Fish. Exper.

Stat. of Dep. of Agr. and Fores., July 9, 1926, depth 267 meters, sandy mud, temp. 6.5°C, 1 female, (Text-fig. 52, J), St. 42, Coll. no. 502; Off Yamada Bay 39°29′, N., 142°10′ E., collected by T/S Sōyō-maru of Fish. Exper. Stat. of Dep. of Agr. and For., July 16, 1926, depth 190 meters fine sand gravel, temp. 8.3°C, 1 male (Type, Text-fig. 51, A), St. 53, Coll. no. 502; Off Miyako Bay 39°34′ N., 142°18′ E., depth 212 meters, sand, temp. 8.3°C, 1 male (Text-fig. 51, D), St. 56, Coll. no. 314; Off Kuji Bay 40°14′, N., 142°05′ E., collected by T/S Sōyō-maru of Fish. Exper. of Dep. of Agr. and For., July 21, 1926, depth 150 meters, sand, temp. 7.8°C, 1 female (Type, Text-fig. 52, I), St. 64, Coll. no. 502; Off Taro 39°45′ N., 142°05′ E., collected by T/S Sōyō-maru of Fish. Exper. Stat. of Dep. of Agr. and For., Nov. 3, 1926, St. 89, depth 124 meters, sand, temp. 11.8°C, 1 male, 1 female, (Text-fig. 51, B and 52, J), Coll. no. 131; 34°41′ N., 139°02′ E., collected by T/S Sōyō-maru of Fish. Exper. Stat. of Dep. of Agr. and For., Nov. 10, 1926, depth 137 meters, 1 male, Coll. no. 132

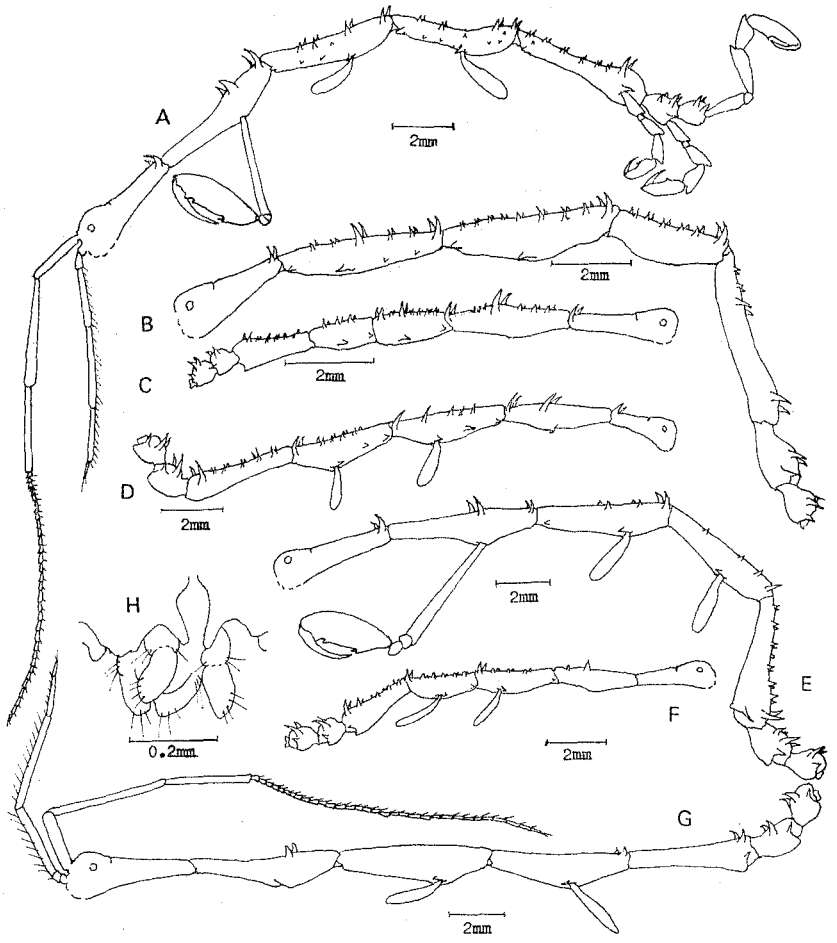

Fig. 51. *Caprella (Caprella) carinata* Arimoto.
A, adult male B-G, adult males; H, abdomen of male (Arimoto, 1934).

(Text-fig. 51, E); Tateyama Bay, collected by Arimoto, Apr. 7, 1927, Coll. no. 7.

DESCRIPTION: Male: Holotype: Body length of adult specimen 24.5 mm (Text-fig. 51, A); long with numerous spines on surface of body; pereonites II and V subequal in length and longer than any other, III a little shorter than II, IV a little shorter than III, VI and VII taken together a little shorter than half of V, I a little longer than head. Head smooth, pereonite I armed with a pair of long hook-like spines processes bent forward at hind of back, pereonite II with a pair of strong dorsal processes forward at posterior end of back, and a pair of strong dorsal processes near front position, pereonite III with 3 pairs of dorsal processes about at center, and a pair of upright processes at distal end, and armed with a sharp lateral projection above point of articulation of gills on each side, and three small processes at each lateral surface on fore part, pereonite IV with 4 pairs of dorsal processes about at center, and a pair of upright processes at distal end, and armed with a sharp lateral projection above point of articulation of gill, and six small processes on each lateral surface of body, and with a lateral process in fore part of each side, pereonite V with six pairs of small processes on back, and a pair of strong processes curved backward at posterior end, and with a lateral tubercle on fore part of each lateral side, and armed with a sharp projection on each side above point of articulation of gill, and one or two small lateral projections on front part on each lateral side, pereonite VI with two pairs of dorsal projections, of which posterior pair is larger than anterior one, and a projection above point of articulation of gill, and pereonite VII with a pair of projections on back.

Antenna 1 about two thirds of body length, its flagellum as long as peduncle, with 32 segments; antenna 2 a little shorter than peduncle of antenna 1, and with a few setae. Incisor of mandible divided into 5 teeth distally, lacinia mobilis provided with 5 weak teeth, setal row of 2 or 3 plumose setae; outer lobe of 1st maxilla tapered terminally, with two branched into fork-like spines 7 at apex, segment 1 of palp short, segment 2 of palp long and widening distally and with 11 long spines, and setiform spines on surface and inner margin; inner lobe of maxilla 2 broader and shorter than the outer, with some 14 or 15 setiform spines on oblique apical, and inner marginal border, outer lobe with 11 or 12 long spines on apical margin of gradually greater length as they approach outer corner, distal margin square; inner lobe of maxilliped carrying three distant spine teeth and several spines planted on inner margin, outer lobe reaching little beyond segment 1 of palp, and with nine spine teeth and several setae on straight inner margin.

Gnathopod 2 attached to rather rear part of pereonite II, its segment 1 a little shorter than pereonite II, propodus a little shorter than segment 1 in length, and subequal to the greatest breadth, which has produced setiferous tooth, at distal angle of palm a triangular tooth, poison tooth situated near by triangular projection with narrow notch in between, palm with small setae; pereopod 5 a little longer than pereonite V, and its segment 1 with long projection at outer corner of apex, segment 3 with three strong spines on inner front margin, propodus with a pair of dentate grasping spines proximally on palmar margin, delicately serrated inner margin,

outer margin with groups of slender spines at 4 points, pereopod 6 a little longer than 5, 7 a little longer than 6.

Gills elongate.

Abdomen with a pair of appendages and a pair of lobes; penes medial.

Female: Allotype: Body length of adult specimen 27 mm (Text-fig. 52, I); pereonite II longer than any other, pereonites III and V subequal in length and a little shorter than II, IV a little shorter than III, VI and VII taken together as long as half of pereonite V, I a little longer than head in length; pereonite I with a pair

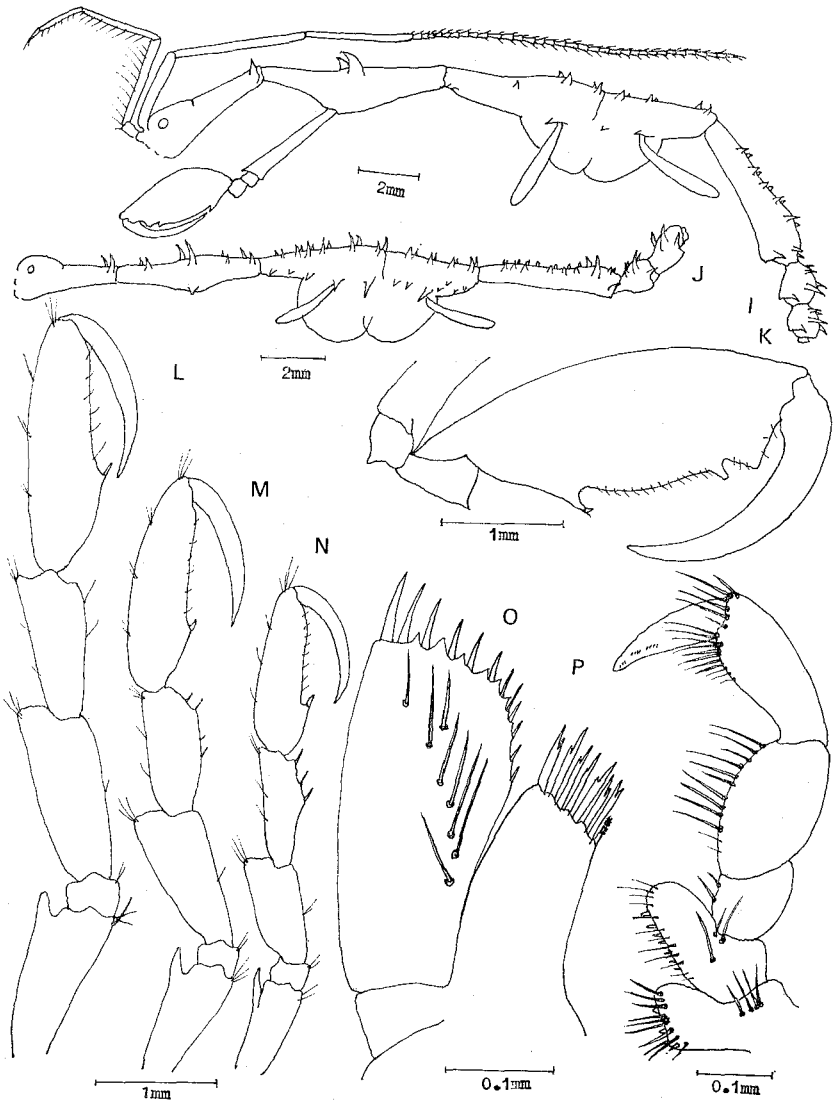

Fig. 52. *Caprella (Caprella) carinata* Arimoto.
I, adult female; J, adult female; K, propodus of gnathopod 2 of male; L, pereopod 7 of male; M, pereopod 6 of male; N, pereopod 5 of male; O, maxilla 1; P, maxilliped (Arimoto, 1934).

of long hook-like projections bent forward at hind end of back, pereonite II with a pair of hook-like projections bent forward at median part of back, pereonite III with three pairs of dorsal processes about at rear and distal end, and about middle part, and armed on each side with a sharp lateral projection bent forward above point of articulation of gill, and with a lateral process in fore part on each side, pereonite IV with three pairs of processes on back and a lateral process in fore part on each side and above point of articulation of gill, pereonite V with six pairs of dorsal processes on back, pereonites VI and VII with two pairs of processes on back.

Antenna 1 a little shorter than body length, its flagellum 33-segmented; gnathopod 2 attached to middle part of pereonite II, its segment 1 a little longer than half of

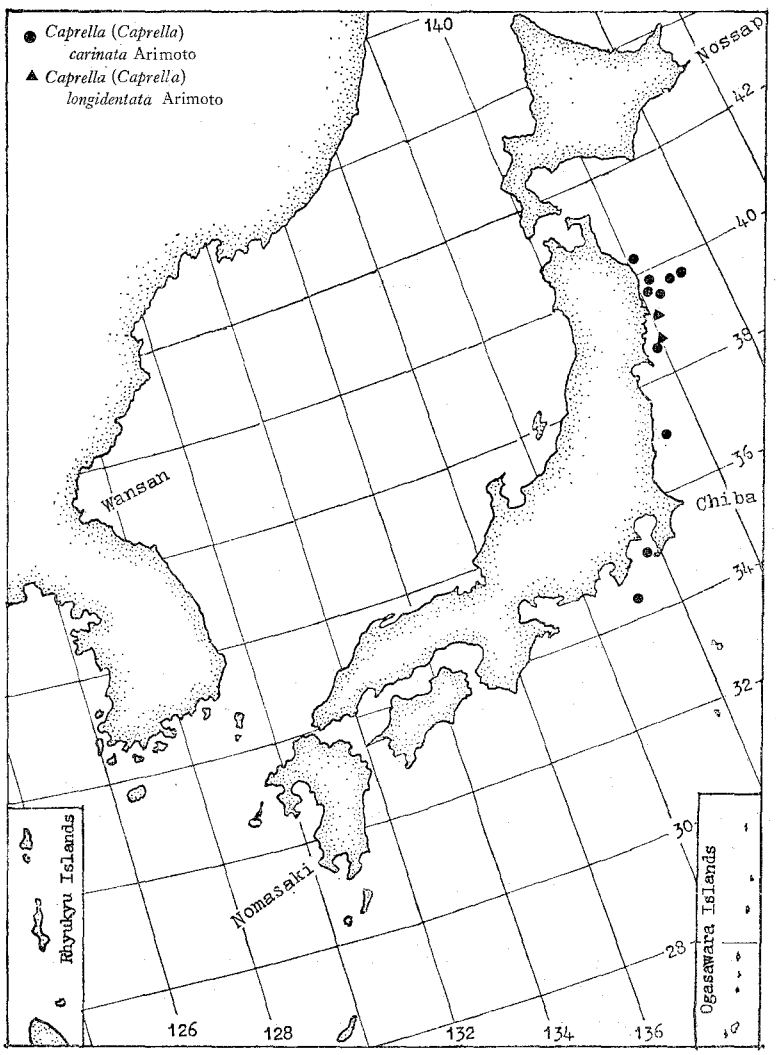

Fig. 53. Distribution records of *Caprella* (*Caprella*) *carinata* Arimoto and *Caprella* (*Caprella*) *longidentata* Arimoto around Japan.

pereonite II, propodus more than twice as long as its greatest breadth.

Change of Dorsal Processes with Age: Larvae without any dorsal processes. In males, processes increase in number rapidly till the animal attains the body length around 10 mm (Fig. 51, C), thereafter they begin to decrease gradually in number with growth (Fig. 51, F, D, B, A, E), and finally in fully-grown males the dorsal processes remain only on pereonites II, IV, V, VI and VII, a single pair on each (Fig. 51, G), which arrangement is alike to the situation at the initial stage of dorsal process development in ontogenetic growth. Similar age change in dorsal processes is also noticed in females (Fig. 52, J, I).

DISTRIBUTION: Type locality: Holotype, off Yamada Bay; Allotype, off Kuji Bay.

Other locality around Japan: From Sunosaki to Kinkazan (Arimoto, 1971: 14).

35. *Caprella (Caprella) longidentata* Arimoto, 1934

(Jap. name: *Nagahanote-warekara* Arimoto, 1971)

Figs. 53, 54.

Caprella longidentata Arimoto, 1934, Dobutsu.-Zasshi, 46 (553): 503–505, pl. 1 figs. 13–16, pl. 2 figs. 6–8, pl. 3 figs. 5, 10, 12, 15, 24, 29. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 30. —— Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 18.

OCCURRENCE: 38°27′ N., 142°00′ E., off Shizugawa Bay, Miyagi Pref., collected by T/S Sōyō-maru of Fisheries Experimental Station of Department of Agriculture and Forestry, July 8, 1926, St. 38, depth 348 meters, sandy mud, temp. 3.3°C, by dredge, 1 male, Coll. no. 504.

DESCRIPTION: Male; Holotype: Body length of adult specimen 39 mm (Text-fig. 54, A), large; pereonite II longer than any other segment, III a little shorter than II, IV and V subequal in length and a little shorter than III, VI and VII taken together a little shorter than half of V, I a little shorter than V; head smooth, pereonite I armed with a pair of dorsal spines at hind end, pereonite II armed with a pair of dorsal spines strongly bent forward, pereonite III and IV with 6 pairs of dorsal spines, anterior 3 pairs very small, 4th spines strong, 5th spines very small, 6th spines at hind end and long, a lateral tooth situated at fore end on each side, and with a smaller tubercle above point of articulation of gills, and 1 or 2 lateral spines, pereonite V with 5 pairs of dorsal spines, its anterior 4 pairs very small, but a pair at hind end long and strongly bent backward, and also with a lateral spine situated at fore end on each side, pereonites VI and VII robust, each with two pairs of dorsal spines.

Antenna 1 a little longer than half of body, its flagellum subequal to peduncle in length, and 30-segmented; antenna 2 shorter than peduncle of antenna 1, and each segment carrying short cilia; incisor of mandible divided into 5 teeth at apex, lacinia mobilis slightly toothed, setal row of 2 or 3 plumose setae; outer lobe of maxilla 1 rectangular form, and with 7 strong fork-like teeth divided into two branches at

apex, segment 1 of palp very short, segment 2 of palp longer than outer lobe, and widening towards dentate, obliquely convex distal margin, which is fingered with 12 slender spines, its outer-most one longer than inner, and setiform spines on surface; inner lobe of maxilla 2 shorter and more oval than outer, with many slender spines with round apical and inner margin, having square distal margin, with many long spines on apical margin of gradually increasing length as they approach outer corner; inner lobe of maxilliped carrying four distant spine-teeth and several featherd spines

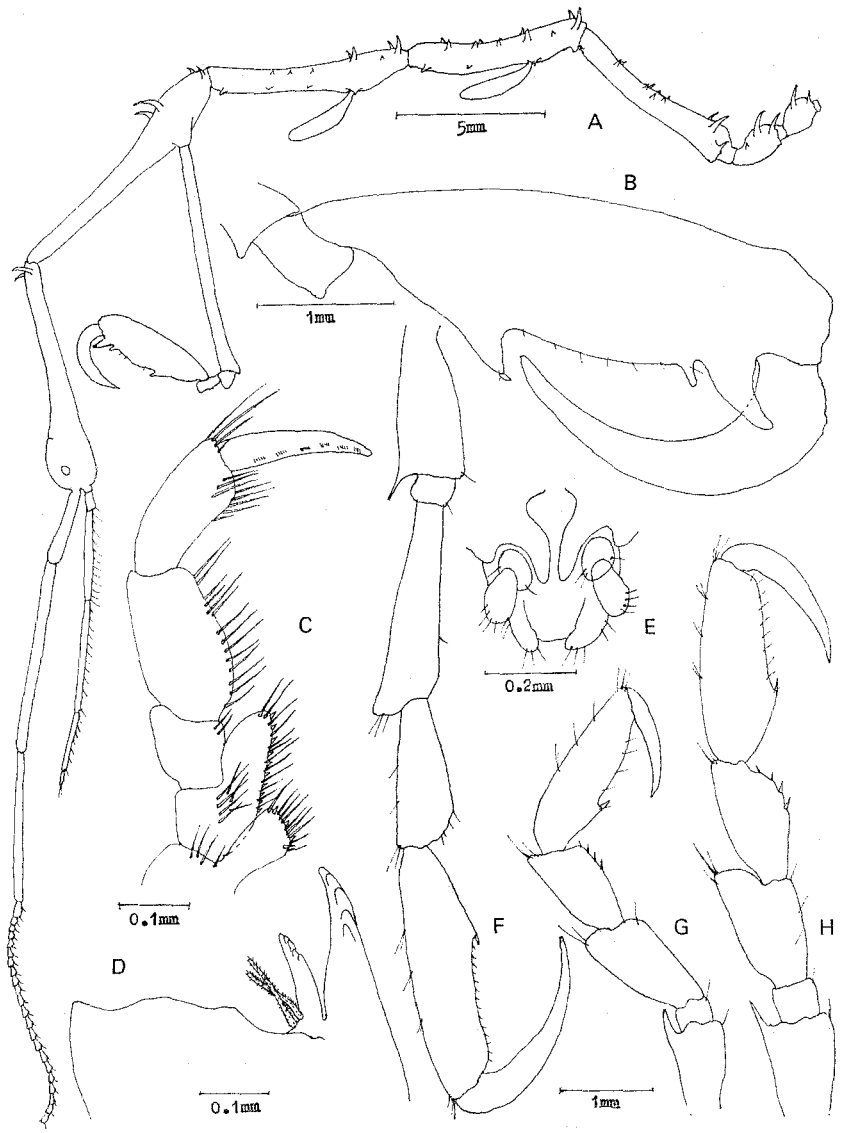

Fig. 54. *Caprella* (*Caprella*) *longidentata* Arimoto.
A, adult male; B, propodus of gnathopod 2 of male; C, maxilliped; D, mandible; E, abdomen of male; F, pereopod 7: G, pereopod 5; H, pereopod 6 (Arimoto, 1934).

planted on apical margin, outer lobe longer than inner, reaching a little beyond segment 1 of palp, with 10-denticulate inner margin with many long spines, segment 1 of palp short and stout with few spines on inner margin, segment 2 a little more than twice the length of segment 1, with many long spines on inner margin, segment 3 a little shorter than 2, its distal half crowded with spines, especially on inner surface.

Gnathopod 2 attached to rather rear part of pereonite II, its segment 1 a little shorter than pereonite II in length, propodus about as long as half of segment 1, and long and large, more than three-times of its greatest breadth, which forms a produced setiferous tooth, at distal angle of palm with a long and large triangular tooth, poison tooth situated near by triangular projection with narrow notch in between; pereopod 5 a little longer than pereonite V, segment 1 with long projection at outer corner of apex, segment 4 about as long as 1 with 4 short and strong spines at inner corner of apex, propodus twice as long as segment 4, with a pair of dentate grasping spines on palmar margin submedial to palmar surface with small and short setae, outer margin with slender spines at 4 points, pereopod 6 longer than 5, pereopod 7 resembling two preceding pairs in shape, but with all segments decidedly longer, segment 3 much longer than segment 4 of pereopods 5 and 6, propodus longer than any other segment.

Gills elongate, attached to pereonites III and IV.

Abdomen with penes medial, a pair of appendages and a pair of lobes.

DISTRIBUTION: Type locality: Off Shizugawa Bay.

Other localities around Japan: Shizugawa Bay and Yamada Bay (Arimoto, 1971: 18).

36. *Caprella (Caprella) soyo* ARIMOTO, 1934

(Jap. name: *Soyo-warekara* Arimoto, 1971)

Figs. 55, 56.

Caprella Sōyō Arimoto, 1934, Dobutsu.-Zasshi, 46 (553): 505–507, pl. 2 figs. 1, 9–11, pl. 3 figs. 6, 11, 13, 18–19, 25, 28, 32; Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 46.

Caprella soyo McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 42.

OCCURRENCE: Off Tomarizaki, 38°42′ N., 141°57′ E., collected by T/S Sōyō-maru of Fisheries Experimental Station of Department of Agriculture and Forestry, July 9, 1926, St. 42, depth 267 meters by dredge, sandy mud, temp. 6.5°C, 1 male, Coll. no. 505; Off Yamada Bay, 39°29′ N., 142°10′ E., collected by T/S Sōyō-maru of Fisheries Experimental Station of Department of Agriculture and Forestry, July 16, 1926, St. 53, depth 190 meters by dredge, fine sand and gravel, temp. 8.3°C, 2 males, Coll. no. 505.

DESCRIPTION: Male: Holotype: Body length of specimen about 30 mm (Text-fig. 55), long and slender; pereonite II longer than any other pereonite, I a little shorter than II, III and V subequal in length and a little shorter than I, IV a little

shorter than III, VI and VII taken together a little longer than one-third of V; head round above with a few small tubercles dorsally, pereonites I-VII with small tubercles on each dorsal and lateral surfaces.

Antenna 1 about as long as half of body length, its flagellum a little shorter than segment 2 of peduncle, and 17-segmented; incisor of mandible divided into 5 teeth at apex, lacinia mobilis slightly toothed, setal row of 2 or 3 plumose setae; maxilla 1, its outer lobe rectangular with teeth, forklike and divided into two branches at apex, segment 2 of palp long, much overtopped, and strongly dentate apex carries

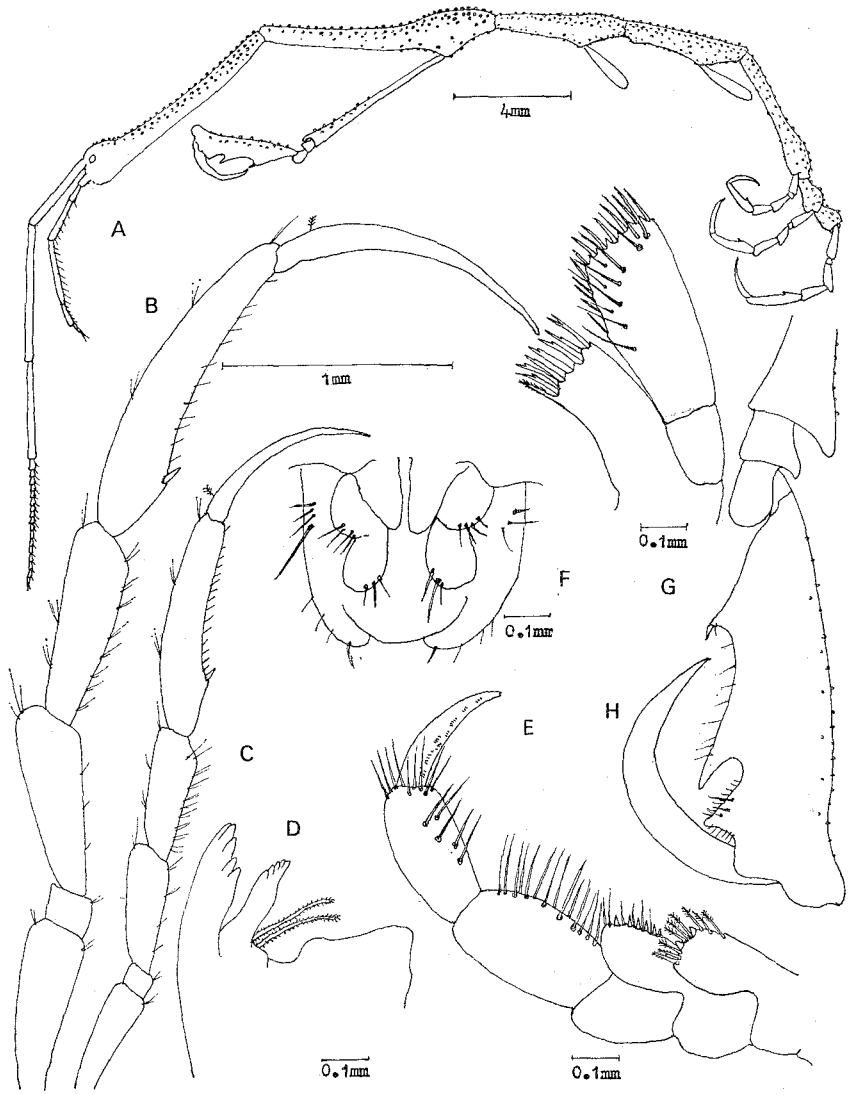

Fig. 55. *Caprella* (*Caprella*) *soyo* Arimoto.
A, male; B, pereopod 7; C. pereopod 5; D, mandible; E, maxilliped; F, abdomen of male; G, maxilla 1; H, propodus of gnathopod 2 of male (Arimoto, 1934).

12 spiny-teeth, and setiform spines on surface below these; inner lobe of maxilla 2 oblong, rather oval, with some slender spines toward apical edge, outer lobe having distal margin square with many rather strong, long spines; inner lobe of maxilliped with two distant spiny-teeth and several feathered spines planted apically or a little below inner margin, outer lobe about as long as inner lobe, and extending a little beyond first segment of palp, with six-denticulate inner margin, and several rather long spines on inner margin, segment I of palp short and stout, segment 2 scarcely twice as long as broad, inner margin fringed with long spines, segment 3 a little shorter than 2, its distal part crowded with spines, especially on inner surface.

Gnathopod 2 lies to rather rear of pereonite II, its segment 1 a little shorter

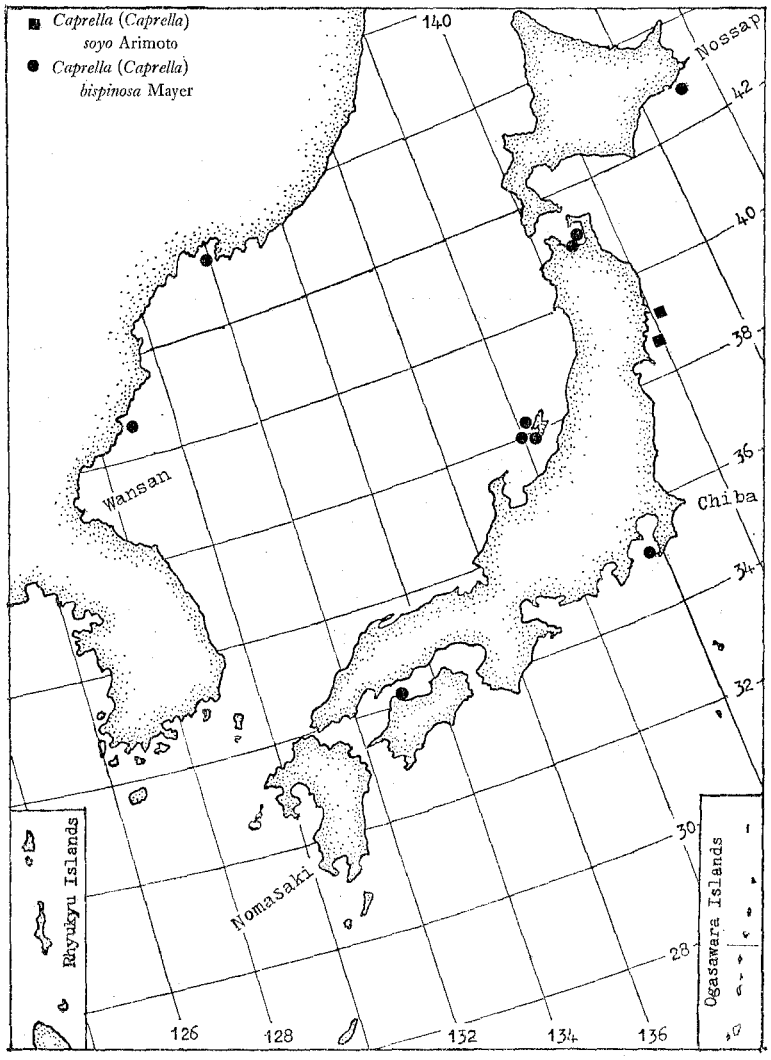

Fig. 56. Distribution records of *Caprella (Caprella) soyo* Arimoto and *Caprella (Caprella) bispinosa* Mayer around Japan.

than pereonite II, propodus a little longer than half of segment 1, and more than four-times as long as its greatest breadth, which becomes a setiferous poison tooth, a triangular tooth at distal angle of palm, poison tooth situated nearly triangular with narrow notch, a rather square process on dorso-frontal part of propodus, small tubercles on surface of propodus; pereopod 5 a little shorter than pereonite V, pereopod 6 a little longer than 5, 7 a little longer than 6, segment 3 of pereopod with several setae on inner margin, segment 5 a little shorter than twice of segment 4, and with a pair of dentate grasping spines proximally on palmar margin, delicately serrate at palmar margin, outer margin with slender spine group at three points.

Gills elongate.

Abdomen with penes medial, a pair of appendages, and a pair of lobes.

DISTRIBUTION: Type locality: Off Tomari Bay, Miyagi Pref.

Other localities around Japan: Yamada Bay (Arimoto, 1971: 18).

37. *Caprella* (*Caprella*) *bispinosa* Mayer 1890

(Jap. name: *Kita-warekara* Utinomi, 1973)

Figs. 56, 57, 58.

Caprella bispinosa Mayer, 1890, Fauna Flora Golf. Neapel. 17: 82–83, pl. 2 fig. 24, pl. 4 figs. 33–34, pl. 7 figs. 14, 42–43. ——Mayer, 1903, Siboga Exped. Mon., 34: 94–95, pl. 4 figs. 1–4. ——Utinomi, 1943, Sci. Rep. Tohoku imp. Univ., (Biol. 4) 17 (3): 283–284, fig. 3. ——Utinomi, 1943, Journ. Fac. Sci. Hokkaido imp. Univ., 6, 8 (3): 286–287, fig. 3. ——Utinomi, 1947, Seibutsu (suppl.), 1: 73. ——Stschapova, Mokyevsky and Pasternak, 1957, Trudy Akad. Nauk USSR, 23: 87. ——Mokyevsky, 1960, Trudy Inst. Okeanol. Akad. Nauk USSR, 34: 255. ——Oshima, 1963, Bull. Hokkaido Fish. Res. Lab., 27: 40, 44. ——Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 216–218, fig. 15. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 13. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 14. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (6): 32.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Aug. 3, 1930, 2 males and 2 females, Coll. no. 103; Sakhalin (Taraika), collected by Sadae Takahashi, Aug. 13, 1930, 10 males, 5 females, Coll. no. 499; Tassha Bay, Sado Island, collected by Yoshiharu Honma, March 18, 1958, 4 males, 5 females, Coll. no. 386; Toyoda, Sado Island, collected by Kitami and Arimoto, May 3, 1970, 17 males, 18 females, Coll. no. 616; Off Futami-mura, Sado Island, collected by Kitami and Arimoto, May 3, 1970, 29 males, 15 females, Coll. no. 630.

DESCRIPTION: Male: This species is one of the commonest forms in the northern region of Japan, being found in great abundance off the coasts of Hokkaido and Sakhalin; armature of dorsal projections is very characteristic. Body length of specimen 23 mm (Text-fig. 57, O); pereonite II longer than any other pereonite, pereonites III, IV and V each subequal and shorter than II, VI and VII taken together a little shorter than half of pereonite II, I about equal to head; head smooth; all dorsal projections become obsolete with some exceptions, a pair of dorsal projections at hind end of pereonite I obsolete, a pair of projections at hind end of pereonite II which are long and hook-like and strongly bent forward, and also with a pair of short upright dorsal projections in the middle, pereonite III armed with a pair of

long hook-like ones strongly bent forward at hind end as in II, and two pairs of short upright projections forward on back, pereonite IV with a strong process curved backward at posterior end of back, together with 3 anterior pairs of short upright dorsal projections, pereonite V with 2 pairs of upright projections, pereonite VI with 3 pairs of small processes, and pereonite VII with a pair of small processes, respectively on back.

Antenna 1 a little longer than half of body length, segment 3 of peduncle with few setae, flagellum 17-segmented; antenna 2 about one-third as long as antenna 1 and shorter than peduncle of antenna 1, flagellum 2-segmented, carrying some setules; inner lobe of maxilliped small, scarcely reaching beyond base of 1st segment of palp, apical border carrying a few embedded spiny-teeth and several spines, outer lobe a little longer than inner lobe and several denticulations on inner margin and long

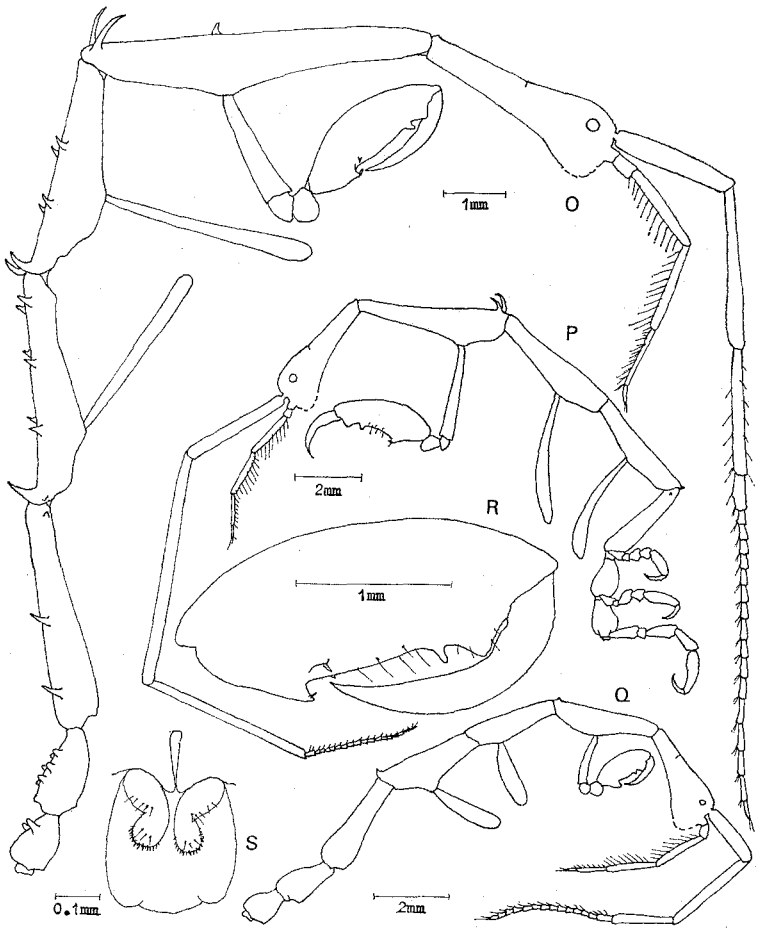

Fig. 57. *Caprella (Caprella) bispinosa* Mayer.
O, adult male (material from Tassha Bay, Coll. no. 86); P, young male (material from Tateyama Bay, Coll. no. 103); Q, young male (ditto, Coll no. 103); R, propodus of gnathopod 2 of male; S, abdomen of male.

slender spines, segment 1 of palp short and stout, 2 scarcely twice as long as broad, inner margin fringed with long spines, segment 3 about as long as 2, its distal part crowded with spines, especially on inner surface.

Pereopod 5 a little shorter than pereonite V, 6 a little longer than 5, 7 a little longer than 6, propodus has no palmar spines, delicately serrate palmar margin, outer margin with slender spines at 4–7 points; gills very long and linear; penes medial; a pair of abdominal appendages with circle of small spines around apical margin.

Female: Body length of adult specimen 13 mm (Text-fig. 58, S); pereonite II

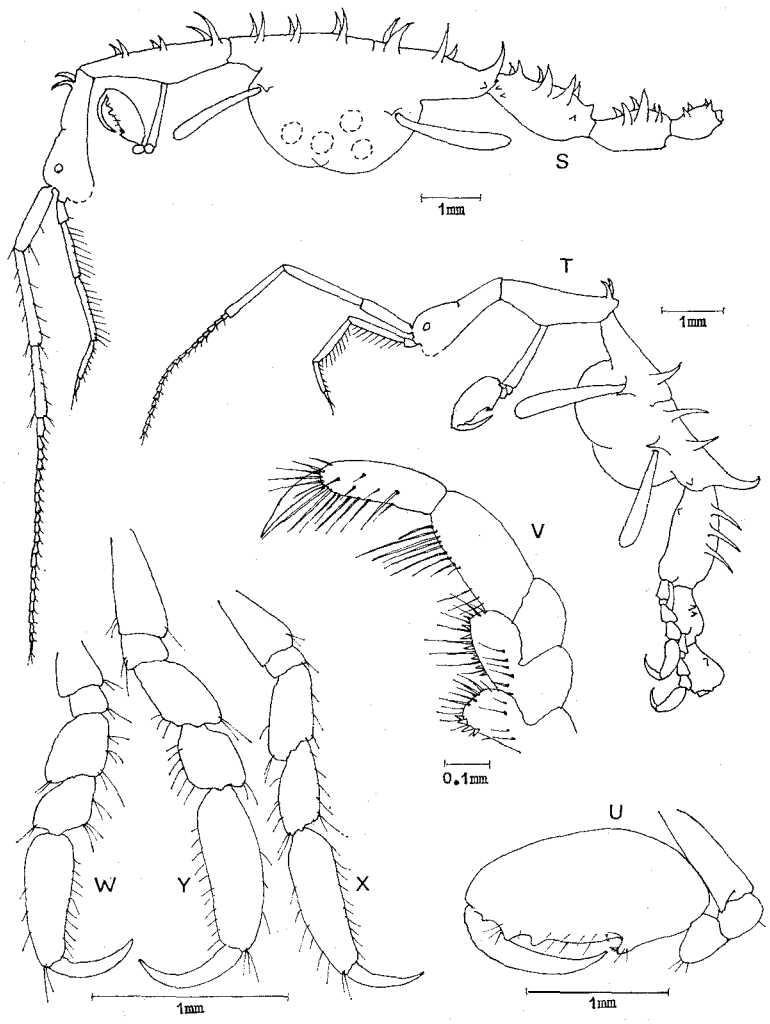

Fig. 58. *Caprella* (*Caprella*) *bispinosa* Mayer.
S, adult female (material from Tassha Bay, Niigata Pref., Coll. no. 386); T, young female (material from Tateyama Bay, Chiba Pref., Coll. no. 103); U, propouds of gnathopod 2 of female; V, maxilliped; W, pereopod 5; X, pereopod 6; Y, pereopod 7.

longer than any other segment, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, VI a little shorter than V, VII a little shorter than VI, I about as long as head; head smooth; pereonite I with a pair of hook-like dorsal projections at hind end, pereonite II armed with a pair of long hook-like ones strongly bent forward at hind end, and two pairs of short upright projections on back, pereonite III with 3 pairs of upright projections, pereonite IV armed with a pair of upright projections at anterior end, a pair on middle, and a strong process curved backward at posterior end on back, and with sharply pointed lateral spine at posterior corner, pereonite V and VI each armed with 3 pairs of short sharp dorsal projections, pereonite VII with two pairs of small dorsal spines.

GROWTH: Male: Body length 19 mm (Text-fig. 57, P); pereonite II, longer than any other segment, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, VI and VII taken together a little shorter than V, I a little longer than head; body smooth except pereonite II, which is armed with a pair of hook-like projections slightly shortened; antenna 1 a little shorter than body length, its flagellum about one-sixth as long as antenna 1, and 18-segmented; antenna 2 much shorter than peduncle of antenna 1; gills long and linear.

Body length of male 15 mm (Text-fig. 57, Q); pereonite II longer than any other segment, pereonites III, IV and V subequal in length and a little shorter than II; body smooth without any projections on back; antenna 1 a little longer than half of body length, its flagellum 14-segmented; gnathopod 2 attached to middle of pereonite II; gills elongate.

GROWTH: Female: Body length 10.5 mm (Text-fig. 58, T); pereonite II longer than any other segment, III a little shorter than II, IV and V about subequal in length and a little shorter than III; pereonite I smooth, pereonite II armed with only a pair of dorsal projections at hind end, pereonite III with only a pair of upright projections on back, pereonite IV has a strong dorsal process curved backward at posterior end, and two pairs of upright projections on back, pereonite V armed with three pairs of long upright projections on back, small lateral processes respectively on pereonites IV and V, and pereonite VI and VII each with one or two pairs of very small upright dorsal projections; propodus of gnathopod 2 about twice as long as its greatest breadth, with setiferous small tooth and subspines.

DISTRIBUTION: Type localities: 45°40′ N., 139°E., West of Sakhalin, coast of Siberia, and China at mouth of the Amur River.

Other localities around Japan and adjacent waters: Sakhalin (Mayer, 1890: 82); Vladivostok (Mayer, 1903: 94); Akkeshi Bay (Utinomi, 1943: 286); Mutsu Bay (Utinomi, 1943: 287); Asamusi (Utinomi, 1943: 283); Northern Japan Sea (45°40′ N, 135° E) (Utinomi, 1947: 73); Tassha Bay Sado Island (Honma, 1956, Coll. no. 386); Possjet Bay (Vassilenko, 1967: 216); Off Futami, Sado Island (Kitami and Arimoto, 1970, Coll. no. 630); Tateyama Bay (Arimoto, 1971: 14).

Other collection: Sakhalin (Sadae Takahashi, 1930. Coll. no. 499); Tassha Bay, Sado Island (Utinomi, 1973: 32); Kurusima Strait, Seto Inland Sea (Utinomi, 1973: 32).

38. *Caprella* (*Caprella*) *mutica* Schurin, 1935

(Jap. name: *Chibikoshitoge-warekara* Arimoto, 1971)

Fig. 59.

Caprella mutica Schurin, 1935, Zool. Anz., 112 (7–8): 198–199, fig. 1. ——Schurin, 1937, Explor. Mers USSR, 23: 27–28, figs. 7–8. ——Utinomi, 1947, Seibutsu (suppl.), 1: 75. ——Stschapova, Mokyevsky and Pasternak, 1957, Trudy Akad. Nauk USSR, 23: 87. ——Vassilenko, 1967, Explor. Fauna Seas USSR., 5 (13): 208. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 32. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 18.

OCCURRENCE: Akkeshi Bay, collected by Akkeshi High School of Fisheries, Sept. 16, 1968, 1 young male, Coll. no. 327.

DESCRIPTION: Reproduced from the original description by Schurin (1935).

Male: Body length of specimen, 12 mm (Text-figs. 59, A, C-E); pereonite II longer than any other, III a little shorter than II, I a little shorter than III, IV a little shorter than I, V a little shorter than IV, VI and VII taken together a little shorter than V; head smooth, pereonite II with many sensory hairs on surface, pereonite III with minute tubercles on back, and with 5 lateral tubercles, pereonite IV and V with minute tubercles on back, pereonites VI and VII with small tubercle on back.

Antenna 1 longer than half of body length, its flagellum 17-segmented; antenna 2 shorter than peduncle of antenna 1. Gnathopod 2 attached to rear part of pereonite II, its basal segment a little shorter than pereonite II, and with many sensory hairs on surface, propodus a little longer than basal segment, and more than twice as long as greatest breadth, produced and bearing a palmar spine, poison tooth situated near by a triangular tooth at distal angle of palm.

Gills elongate.

Pereopod 5 a little longer than pereonite V, 6 a little longer than 5, 7 a little longer than 6, its propodus longer than any other segment of pereopods, and with a pair of grasping spines proximally, but propodus of pereopod 6 of adult and pereopod 5 of young with 3 or 4 spines at palmar margin.

Young male: Body length of specimen 8 mm (Text-fig. 59, B, F); body smooth except V; pereonite I shorter than any other pereonite, pereonite V with 3 pairs of small tubercles on back; flagellum of antenna 1 9-segmented; antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached to middle part of pereonite II; pereopod 5 a little longer than pereonite V, its propodus carrying two palmar spines at a distance from base of about one-third of total length, and with three spines on palmar margin.

DISTRIBUTION: Type locality: Peter the Great Bay.

Other records: Putjatin Island.

Other localities around Japan and adjacent waters: Possjet Bay (Vassilenko, 1967: 208).

New locality: Akkeshi Bay (Akkeshi High School of Fish., 1968, Coll. no. 237).

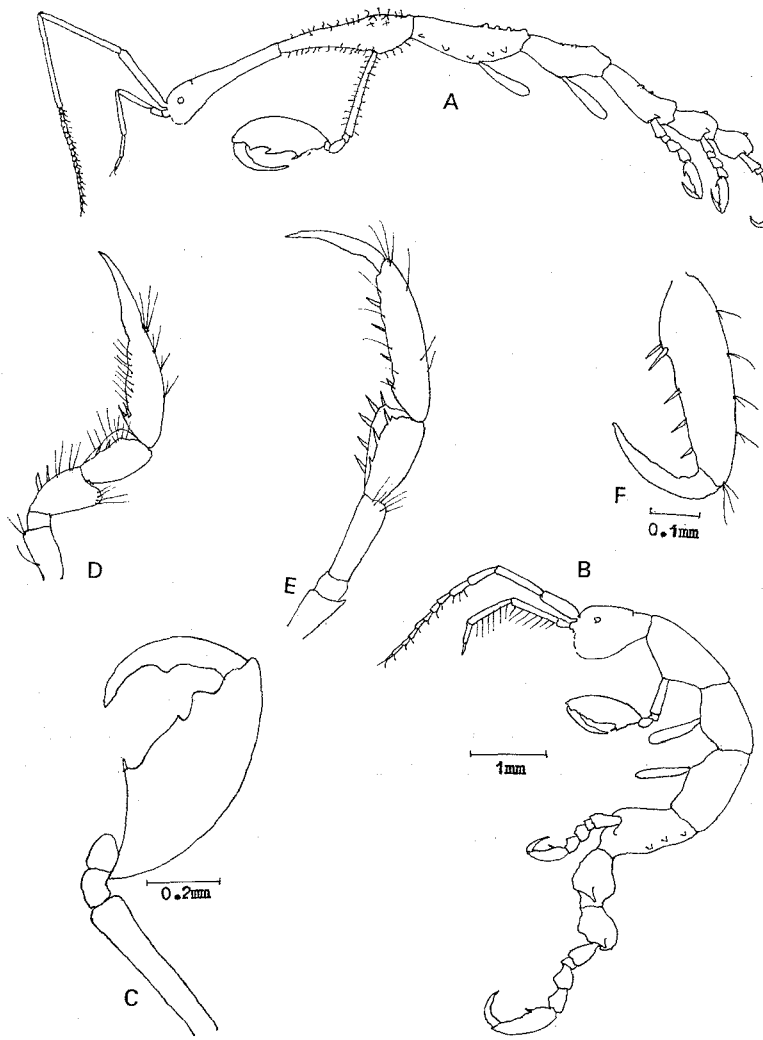

Fig. 59. *Caprella* (*Caprella*) *mutica* Schurin.
A, adult male (Schurin, 1937); B, young male (material from Akkeshi Bay, Coll. no. 327); C, propodus of gnathopod 2 of male; D, pereopod 5; E, pereopod 6; (C-E Schurin, 1937); F, propodus of pereopod 5 of young male (Arimoto).

39. *Caprella* (*Caprella*) *bidentata* Utinomi, 1947

(Jap. name: *Futatoge-warekara* Utinomi, 1964)

Figs. 60, 61.

Caprella bidentata Utinomi, 1947, Seibutsu (suppl.), 1: 72–73, fig. 3. ——Irie, 1958, Bull. Fac. Fish. Nagasaki Univ., 7: 89, 91. ——Irie, 1959, Bull. Fac. Fish. Nagasaki Univ., 8: tab. 4. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14, pl. 2 fig. 3, pl. 3 fig. 3, ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 13. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 14. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 32.

OCCURRENCE: Shimonoe off Usuki-shi, collected by Yoshiaki Torijima, Mar.

15, 1968, attached to pearl oyster shell, 1 female, Coll. no. 182.

DESCRIPTION: Female: Body length of adult specimen 13 mm (Fig. 60, K); pereonite II the longest of all segments, V a little shorter than II, III a little shorter than V, IV a little shorter than III, VI and VII taken together a little shorter than V, I about twice as long as head; head angularly produced in front; pereonites I and II smooth, pereonite III with a pair of projections on rear part of middle of back, a lateral tooth on each side situated at fore end, and a lateral spine tooth placed just above point of attachment of gills, pereonite IV with a pair of prominent teeth on middle of back, a lateral spine tooth placed above attachment of gills, and a lateral process on fore part on each side, and a process inclining back wards at distal end, pereonites V-VII each with a pair of projections on back.

Antenna 1 a little shorter than body length, its flagellum, 19-segmented; antenna 2 a little shorter than peduncle of antenna 1, and with setae; gnathopod 2 attached to middle part of pereonite II, its segment 1 long and a little shorter than pereonite II and projecting forward at its distal end, propodus a little shorter than segment 1, and more than three-times as long as its greatest breadth, with a setiferous spine tooth, poison tooth situated at nearly distal angle, and palm fringed with small spines, with evenly convex front margin equipped with 3 pairs of small spines.

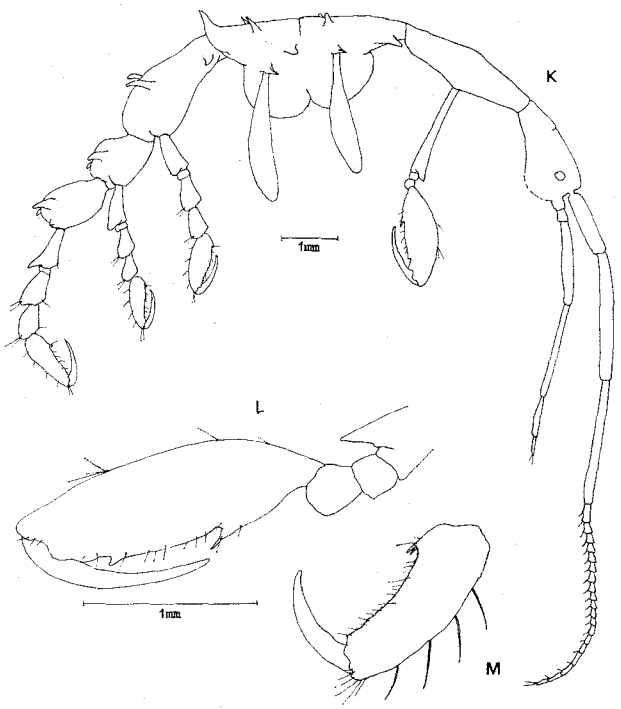

Fig. 60. *Caprella* (*Caprella*) *bidentata* Utinomi.
K, male; L, propodus of gnathopod 2 of male; M, propodus of pereopod 7. (Material from off Usuki-shi, Ohita Pref., Coll. no. 182).

Gills club-shaped, a little longer than the attached segment; pereopod 5 a little longer than pereonite V in length, 6 a little longer than 5, 7 a little longer than 6, inner margin of propodus with two grasping spines proximally, slightly concave, and delicately serrate, and the outer margin has slender spines at 4 points.

DISTRIBUTION: Type localities: Mukaishima, Hiroshima Pref., and Nanao Bay, east of Noto Peninsula.

Other localities around Japan: Nanao Bay (Utinomi, 1947: 72); Mukaishima (Utinomi, 1947: 72); Sasebo, (Irie, 1958: 91); Tomioka, Amakusa (Utinomi, 1964: 14); Usuki Bay (Arimoto, 1971: 14); Near Sasima, east of Sagami Bay, BLIH-Crust. 2119 (Utinomi, 1973: 32).

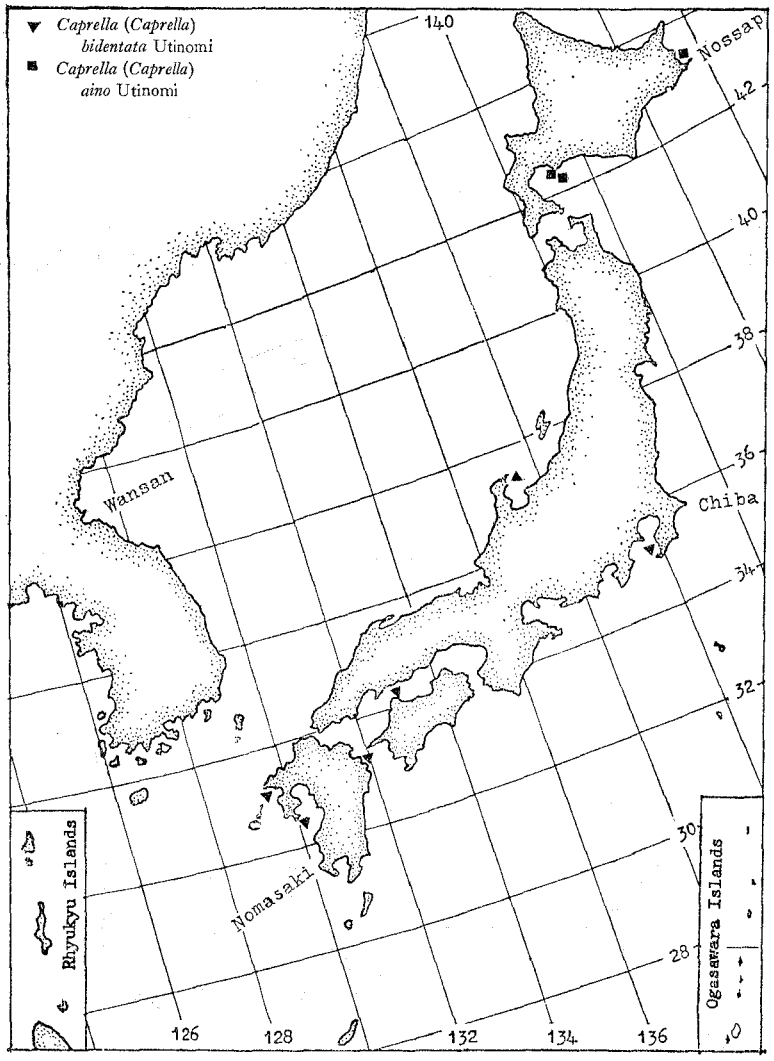

Fig. 61. Distribution records of *Caprella (Caprella) bidentata* Utinomi and *Caprella (Caprella) aino* Utinomi around Japan.

40. *Caprella* (*Caprella*) *aino* Utinomi, 1943

(Jap. name: *Ezo-warekara* Utinomi, 1971)

Figs. 61, 62.

Caprella aino Utinomi, 1943, Journ. Fac. Sci. Hokkaido Imp. Univ., 6, 8 (3): 284–286, fig. 2. ——Utinomi, 1947, Seibutsu (suppl.), 1: 72. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 12. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 13. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 32.

OCCURRENCE: Off Date-cho, Hokkaido, collected by Usu Branch of Hokkaido Central Fisheries Experimental Station, Sept. 1968, 9 males and 13 females, Coll. no. 333, together with numerous species of *Caprella penantis*.

DESCRIPTION: Male: Body length of adult specimen 10.5 mm (Text-fig. 62, A); rather slender, pereonite II longer than any other segment, III a little shorter than II, IV and V subequal in length and a little shorter than III, VI and VII taken together a little shorter than V, I a little shorter than head, which is smooth; pere-

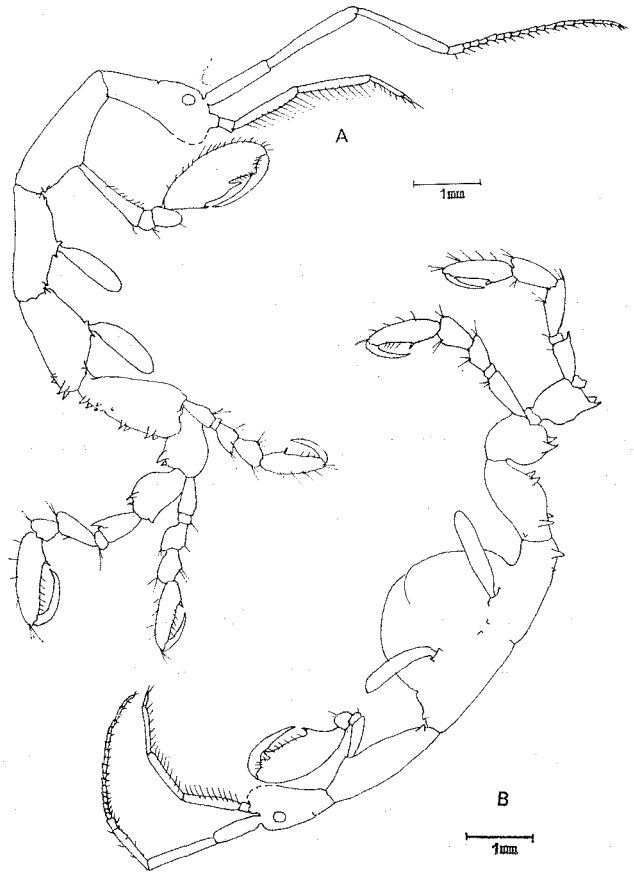

Fig. 62. *Caprella* (*Caprella*) *aino* Utinomi (after Utinomi).
A, adult male; B, adult female.

onite I smooth, II armed with a small tooth at posterior ventro-lateral corner, III and IV each provided with a small tubercle on front and hind ventro-lateral corners, and also with two smaller tubercles above point of articulation of gills, hind end of back of pereonite IV armed with two pairs of tubercles, with posterior pair larger than anterior, pereonite V with 4 pairs of small dorsal tubercles, with anterior two separated by transverse groove from posterior two, pereonites VI and VII robust with a pair of dorsal tubercles; abdomen usual and penes medial.

Antenna 1 longer than half of body length, peduncle somewhat plump, flagellum slightly longer than segment 2 and 19-segmented; antenna 2 a little shorter than peduncle of antenna 1 and with setae. Gnathopod 2 attached to a little behind middle of pereonite II, its segment 1 shorter than pereonite II, elongate, straight, and quadrate at its distal end, segment 3 with round end, propodus oblong, nearly as long as stalk, tapering both proximally and distally, palm occupying two-thirds of hind margin, with a large strong poison tooth at its center separated by a deep notch from a triangular projection at distal angle, palmar angle bearing a long submedial spine and somewhat produced downward; propodus of pereopods 5–7 with submedial grasping spines.

Gills long and narrow.

Female: Body length of adult specimen 9.5 mm (Text-fig. 62, B); pereonite II longer than any other, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, VI and VII taken together a little longer than V, I as long as half of head; head and pereonite I smooth, pereonite V with two pairs of small dorsal tubercles.

Antenna 1 longer than half of body length, flagellum a little shorter than its peduncle and 20-segmented; antenna 2 a little longer than peduncle of antenna 1, and with setae. Gnathopod 2 attached to rather front part of pereonite II, its segment 1 as long as one-third of pereonite II, propodus a little shorter than pereonite II, more than twice as long as its greatest breadth; pereopods 5–7 with clasping spines submedially, outer margin with groups of slender spines at 5 points.

DISTRIBUTION: Type locality: Muroran (Utinomi, 1943: 284).

Other locality around Japan: Off Date-cho, Hokkaido (Arimoto, 1971: 13); Bentenzima, Nemuro (Utinomi, 1973: 32).

41. *Caprella (Caprella) irregularis* Mayer, 1890

(Jap. name: *Midare-warekara* Arimoto, 1971)

Fig. 63.

Caprella irregularis Mayer, 1890, Fauna Flora Golf. Neapel, 17: 84, pl. 2 figs. 16–18, pl. 4 fig. 32. ——Mayer, 1903, Siboga Exped. Mon., 34: 106. ——Holmes, 1904, Harriman Alaska Exped., 10: 241. ——Utinomi, 1947, Seibutsu (suppl.), 1: 74. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 25. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 17.

No specimen in the author's collection.

OCCURRENCE: Coast of Korea, 109.7–182.9 meters, collected by Suenson in

1882, 7 males and young females (Mayer, 1890: 84).

DESCRIPTION: Reproduced from Mayer's description, 1890.

Male: Body length of adult specimen 16 mm (Text-fig. 63, A); pereonite II longer than any other, III shorter than II, IV a little shorter than III, V a little shorter than IV, VI and VII taken together a little shorter than V, I a little shorter than III; head smooth, pereonite III with a large spiky spine on fore part of each side, pereonite V with a pair of upright dorsal projections at median part, pereonite VI with a pair of upright projections on median of back.

Antenna 1 a little shorter than half of body length, its flagellum 15-segmented; antenna 2 a little shorter than peduncle of antenna 1, and with swimming setae; gnathopod 2 lies to rather rear of pereonite II, its segment 1 a little longer than half of pereonite II, propodus a little longer than segment 1 and more than twice as long as its greatest breadth, with produced setiferous tooth and two small subspines at distal angle of palm and with a small triangular tooth, poison tooth situated near by triangular projection with a narrow notch in between; pereopod 5 a little longer than

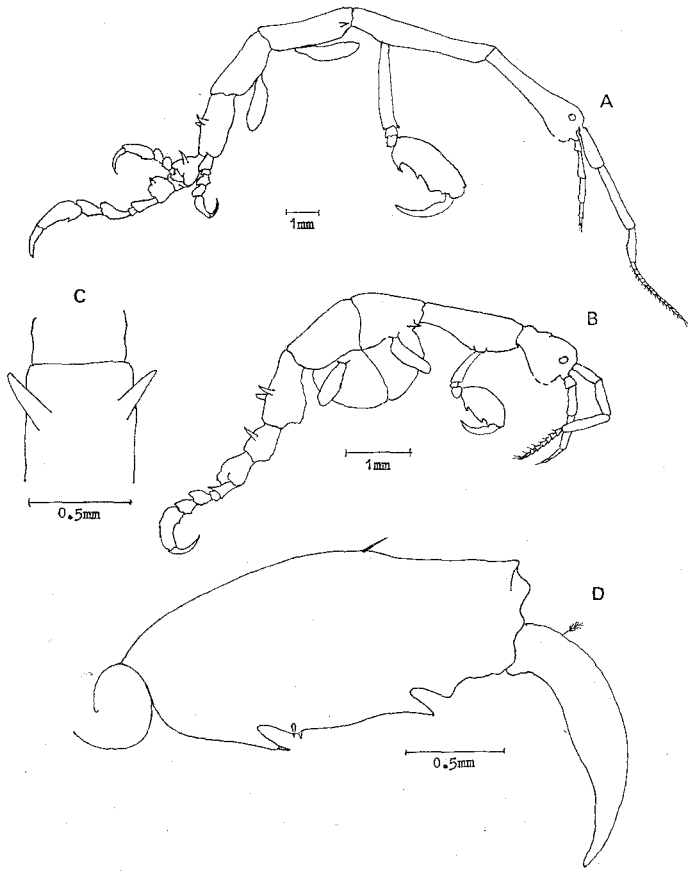

Fig. 63. *Caprella* (*Caprella*) *irregularis* Mayer (after Mayer).
A, adult male; B, adult female; C, lateral spines of pereonite III of young male; D, propodus of gnathopod 2 of male.

pereonite V in length, 6 a little longer than 5, 7 a little longer than 6, these propodus each with two palmar spines; gills elongate.

Female: Body length of adult specimen 7.5 mm (Text-fig. 63, B); pereonite II longer than any other segment, pereonites III, IV and V subequal in length, and a little shorter than II, VI and VII taken together a little shorter than V, I about as long as head; pereonite III with a spiky spine on fore part of each lateral side, pereonite V with a pair of upright dorsal projections on median part of back, pereonite VI with a pair of upright dorsal projections at median point.

Antenna 1 short, about as long as one-third of body length, and rather plump, flagellum 9-segmented; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to rather front part of pereonite II, its segment 1 about one-fourth of pereonite II, propodus a little longer than segment 1 and a little shorter than twice its greatest breadth.

DISTRIBUTION: Type locality: Coast of Korea, 109.2–182.0 meters.

Other records: Iliuliuk Harbor and Orca, Alaska, 10.92 meters.

Other locality around Japan and adjacent waters: Coast of Korea (Mayer, 1980: 84).

42. *Caprella (Caprella) nagaoi* Arimoto, 1970

(Jap. name: *Nagao-warekara* Arimoto, 1971)

Fig. 64.

Caprella nagaoi Arimoto, 1970, Bull. Japanese Soc. Sci. Fish., 36 (7): 676–677, fig. 1. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 19.

OCCURRENCE: Akkeshi Bay, collected by Zen Nagao, July 26, 1967, among dredged benthos, 4 males, Coll. no. 254, together with numerous specimens of *Caprella drepanochir* Mayer.

DESCRIPTION: Male: Holotype: Body length of specimen 9.5 mm (Text-fig. 64, A); pereonite II longer than any other segment, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, VI and VII taken together subequal to pereonite V, I a little longer than head in length; back of body spinose, especially on III, IV and V, pereonite V with a large tubercle on rear part of back, pereonite III and IV each with a large spiky lateral tubercle on fore part of lateral side.

Antenna 1 about one-third of body length, segment 3 of peduncle rather plump, its flagellum, 10- or 11-segmented; antenna 2 shorter than peduncle of antenna 1; gnathopod 2 lies to rather rear of pereonite II, extending over about double length of pereonite II, segment 1 somewhat shorter than propodus, a rather flat square tubercle on dorso-frontal part of propodus, distal angle of palm triangular and separated from poison tooth by deep concavity, and one pair of grasping spines and several subspines at base of palm.

Gills oval, attached to pereonites III and IV.

Pereopods 5, 6 and 7 almost similar to each other in shape and size, but 7 longer than any other pereopod, 6 a little shorter than 7, 5 a little shorter than 6, propodus of each pereopods have a pair of palmar spines, and small fringed spines, outer margin has groups of slender spines at 5 points.

Abdomen with a pair of large appendages, penes medial.

DISTRIBUTION: Type locality: Akkeshi Bay.

Locality around Japan: Akkeshi Bay (Arimoto, 1970: 676–677).

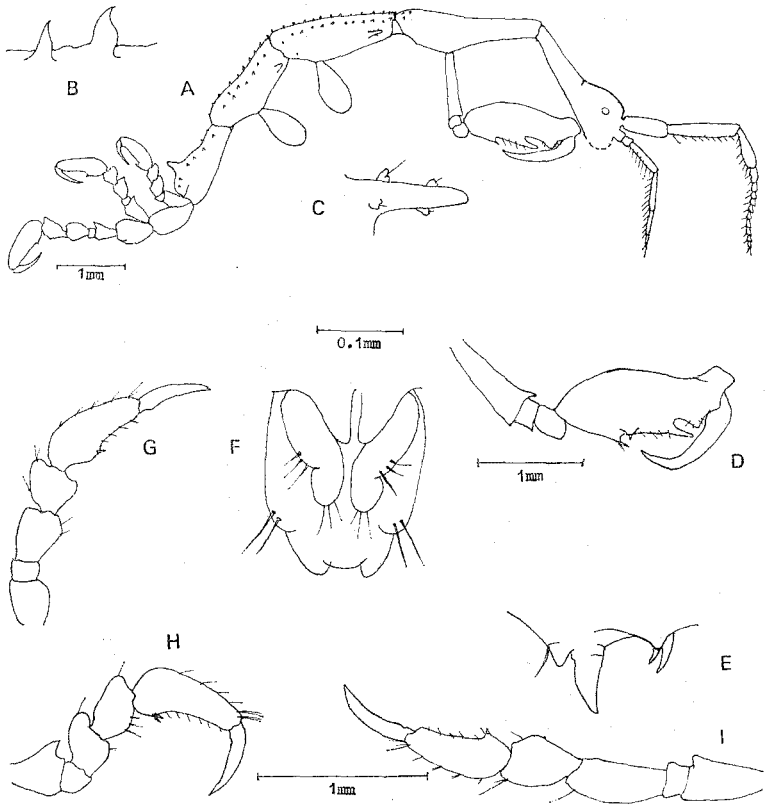

Fig. 64. *Caprella* (*Caprella*) *nagaoi* Arimoto.
A, adult male; B, processes of surface of body; C, lateral projection of pereonite III; D, propodus of gnathopod 2 of male; E, palmar spines of gnathopod 2 of male; F, abdomen of male; G, pereopod 6; H, pereopod 5; I, pereopod 7 (Arimoto, 1970).

43. *Caprella* (*Caprella*) sp. Mayer, 1903

Fig. 65.

Caprella sp. Mayer, 1903, Siboga Exped. Mon., 34: 130, pl. 5, fig. 33.

No specimen in the author's collection.

OCCURRENCE: Sakhalin, Aniva Bay, collected by W.I. Issaef, Sept. 1890, 1

male (Mayer, 1903: 130).

DESCRIPTION: After Mayer's description, 1903: 130.

Male: Body length of adult specimen 10 mm (Text-fig. 65, A); smooth except pereonite V, its segment with two pairs of dorsal processes; palmar spines of propodus on pereopod 7 sometimes present, sometimes not.

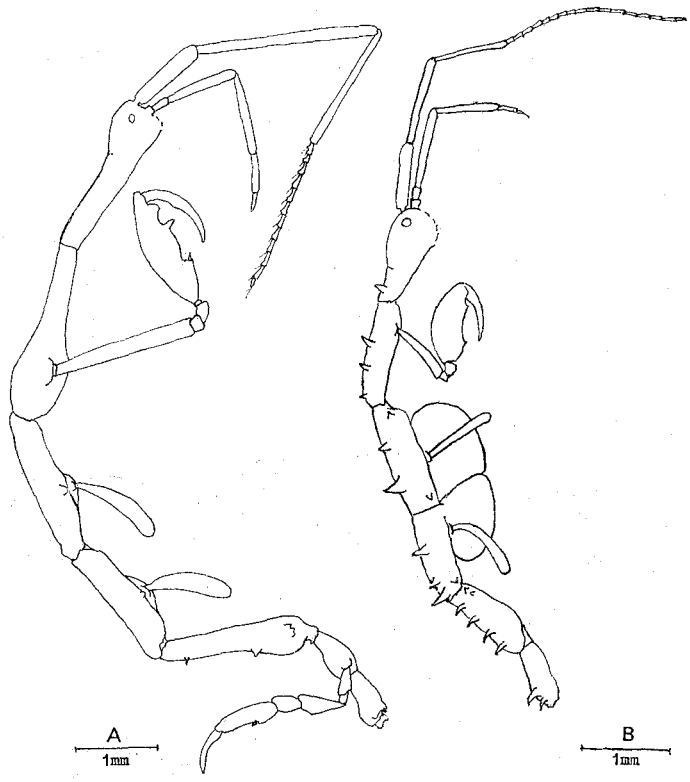

Fig. 65. *Caprella* (*Caprella*) sp. Mayer (after Mayer).
A, adult male from Sakhalin; B, adult female from Vladivostok.

b) Subgenus *Spinicephala*, n. subgen.

The head of the adult is spherical or oval but provided with one or several spines.

Type Species: *Caprella* (*Spinicephala*) *acanthifera* Leach.

The following species, all belonging to subgen. *Spinicephala*, are collected in the world, but no record has so far been made around Japanese waters up to 1973.

lukini Vassilenko, *alaskensis* Holmes, *corvina* Mayer, *acanthifera* Leach, *erethizon* Mayer, *gigantea* Holler, *litoralis* Vassilenko, *clavigera* Vassilenko, *echinata* Haswell, *rinki* Stephensen, *gorgonia* Laubitz, *unica* Mayer, *pacifica* Vassilenko, *alaskana* Mayer, *rotundidentata* Vassilenko, *dubia* Hansen, *media* Vassilenko, *tuberculata* Guerin, *zygodonta* Vassilenko, *parapaulina* Vassilenko, *kincaidi* Holmes, *horrida* Sars, *scabra* Holmes, *pusulata* Labutz, *angulosa* Mayer, *distalis* Mayer, *rhinoceros* Mayer, *advena* Vassilenko, *striata* Mayer, *carina* Mayer, *constantina* Mayer, *singularis* Mayer, *longicirrata* Vassilenko.

44. *Caprella (Spinicephala) cristibrachium* Mayer, 1903

(Jap. name: *Tosakaera-warekara* Arimoto, 1971)

Fig. 66.

Caprella acutifrons f. *cristibrachium* Mayer, 1903, Siboga Exped. Mon., 34: 84, pl. 3 figs. 12–13.
Caprella acutifrons (not Latreille, 1816), Stschapova, Mokyevaky and Pasternak, 1957, Trudy Akad. Nauk USSR, 23: 87.
Caprella cristibrachium Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 197–200, figs. 1–4. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 16. ——Arimoto,1971, Bull.Biogeogr. Soc. Japan, 26 (3): 15.

No specimen in the author's collection.

OCCURRENCE: Possjet Bay (Vassilenko, 1967).

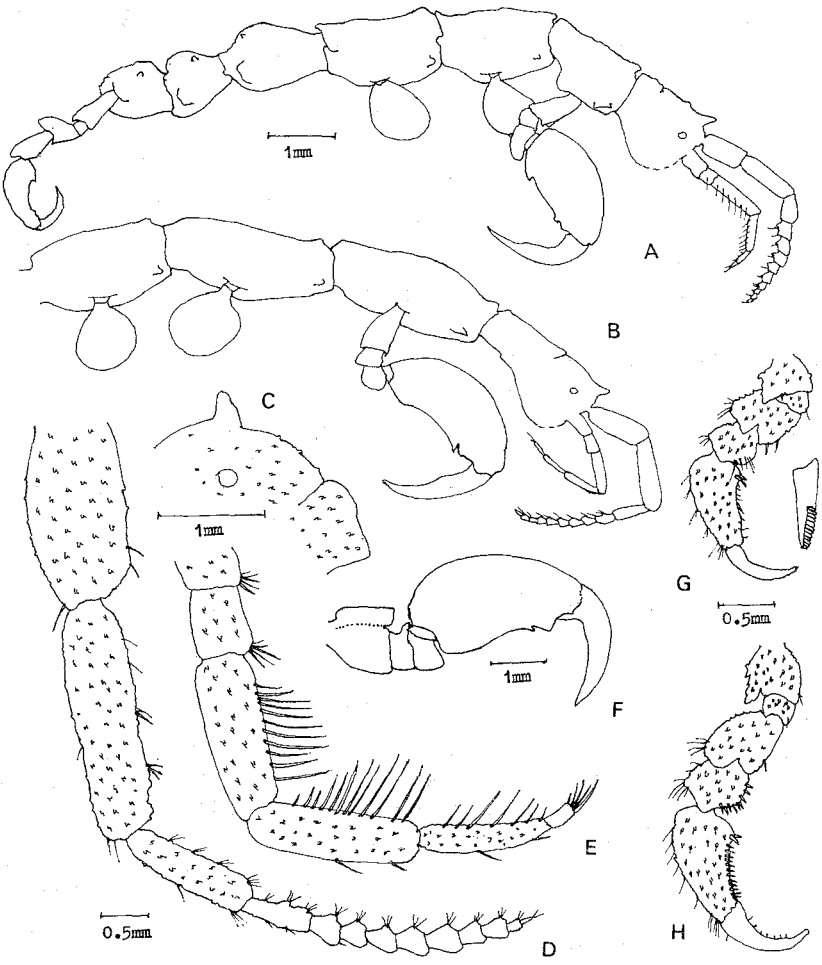

Fig. 66. *Caprella (Spinicephala) cristibrachium* Mayer.
A, adult male; B, adult male (A-B, after Mayer, 1903); C, head; D, antenna 1; E, antenna 2; F, gnathopod 2 of male; G, pereopod 5; H, pereopod 7 (C-H, after Vassilenko, 1967).

DESCRIPTION: With reference to Mayer's and Vassilenko's descriptions (Mayer, 1903: 84 and Vassilenko, 1967: 197).

Male: Body length of adult specimen 10 mm (Fig. 66, A); the surface of body, antenna and pereopods with many small tubercles, these tubercles having a sensory hair. Pereonites II and III subequal in length, and longer than any other pereonite, IV a little shorter than III, V a little shorter than IV, VI and VII taken together to make a length a little longer than V, I about half as long as head; head with a blunt dorsal projection curved slightly forward above the eye, a lateral projection on each side on front margin of pereonite II, a lateral process on each side situated at the fore-end of pereonites III and IV, pereonites V, VI and VII with a small pair processes on back; eye small.

Antenna 1 plump and short, about one-third of body length, its flagellum a little shorter than peduncle, and 9-segmented; antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached to middle part of pereonite II, segment 1 very much shorter than propodus, widened distally, with a small projection at front apex, wrist broader than its length, and clearly distinguished from propodus, propodus a little longer than pereonite II, and about twice as long as its greatest breadth, without spine, poison tooth at a nearly frontal angle, but very small, pereopod 5 longer than pereonite V, and a little shorter than pereopod 6, 6 a little shorter than 7, propodus is the longest of these all segments, and with a pair of dentate grasping spines proximally on palmar margin, outer margin with slender spine groups at 7 or 8 points.

DISTRIBUTION: Type localities: Bering Sea, Commander Islands; Bay of Islands, Adakh, Alaska, 15.38–129.12 meters; and 58°34′15 N., 162°22′ W., 16.4–38.4 meters.

Other records: Putjatin Island and Possjet Bay, the Japan Sea.

Other locality around Japan and adjacent waters: Possjet Bay (Vassilenko, 1967: 197–200).

45. *Caprella (Spinicephala) verrucosa* Boeck, 1872

(Jap. name: *Kobu-warekara* Utinomi, 1969)

Figs. 67, 68.

Caprella verrucosa Boeck, 1872, Forh. Vidensk. Selsk. Christiania, 1871: 38–39, 48, fig. 4. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 69. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 73–74. ——Dougherty and Steinberg, 1953, Proc. biol. Soc. Washington, 66: 44, 47. ——Dougherty and Steinberg, 1954, in Light et al., Intertidal Invert. Centr. California Coast: 170, 171. ——Johnson and Juskevice, 1965, Res. Rep. Pacific mar. Sta., 5: 39. ——Utinomi, 1969, Publ. Seto mar. biol. Lab., 16 (5): 304–305. ——Laubitz, 1970, Pub. Biol. Ocean. 1: 44. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 45. ——Arimoto, 1971e, Bull. Biogeogr. Soc. Japan, 27 (6): 46. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 37.

Caprella septentrionalis f. *verrucosa* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 66, 67, 68.

Caprella septentrionalis f. *parva* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 66.

Caprella acutifrons f. *verrucosa* Mayer, 1903, Siboga Exped. Mon., 34: 83. ——Arimoto, 1930, Journ. Tokyo nat. Hist. Soc., 28 (39): 49–50, fig. 4. ——Utinomi, 1943, Sci. Rep. Tohoku imp. Univ., (Biol.

4) 17 (3): 274–275, figs. 2b, 3b. ——Hewatt, 1946, Ecol. Monogr., 16 (3): 194, 196, 199. ——Utinomi, 1947, Seibutsu (suppl.), 1: 72. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14, pl. 1 fig. 2b, pl. 3 fig. 6.

Caprella acutifrons (not Latreille, 1816), LaFollette, 1915, Journ. Ent. Zool. Pomona Coll., 7 (1): 55–56, pl. 1 figs. 1–2.

Caprella tuberculata (not Guérin, 1836), Shaw, 1916, Journ. Ent. Zool. Pomona Coll., 8 (2): 86–87, figs.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Apr. 4, 1928, attached to *Sargassum*, 1 female, Coll. no. 16, Aug. 18, 1928, 1 male, Coll. no. 60; Tateyama

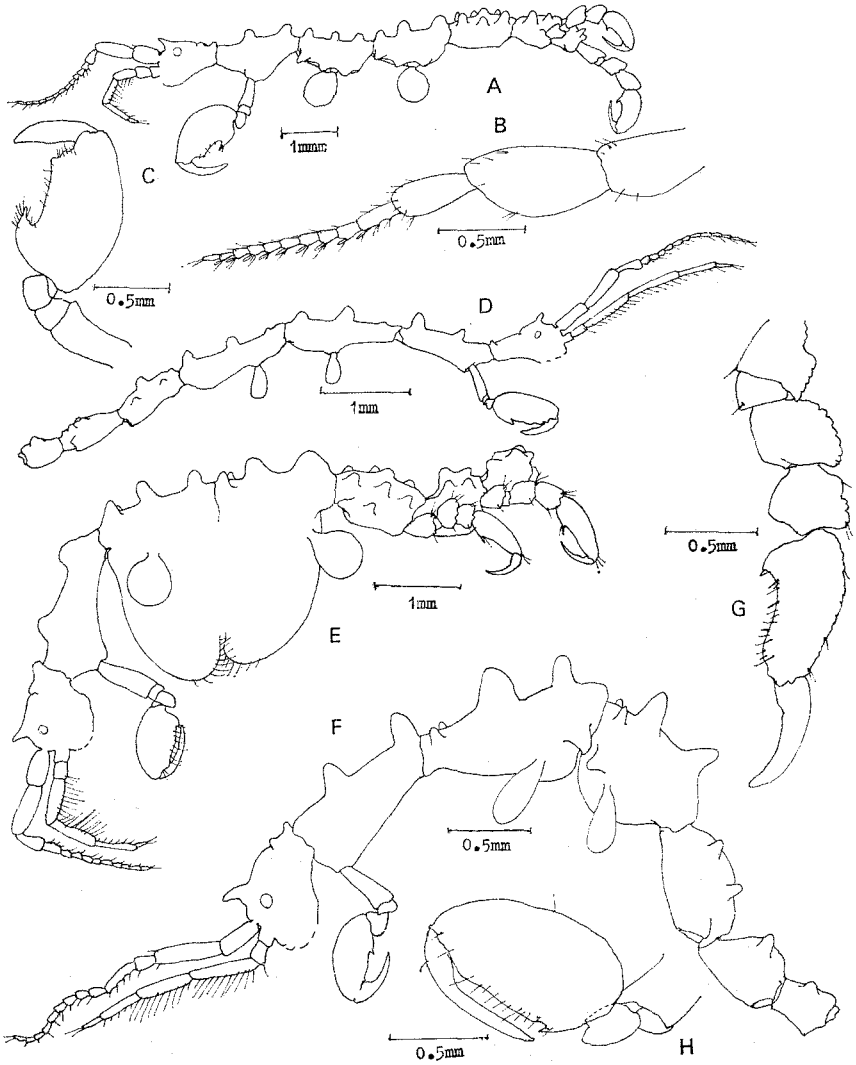

Fig. 67. *Caprella* (*Spinicephala*) *verrucosa* Boeck.
A, adult male (material from Tateyama Bay, Coll. no. 94); B, antenna 1 of adult male; C, gnathopod 2 of adult male; D, young male (material from Tateyama Bay, Coll. no. 60); E, adult female (Arimoto, 1930); F, young female (material from Tassha Bay, Coll. no. 409); G, pereopod 7; H, gnathopod 2 of adult female.

Bay, collected by Yaichiro Okada, VII 7, 1969, 1 male, 2 females, attached to *Sargassum*, 2 males, 2 females, attached to *Gelidum*, IV 17, 1969, Coll. no. 94; Off Aiocho, collected by Yamaguchi Inland Sea Fish. Exp. Sta., June 15, 1968, Coll. no. 310; Senkaku Ikkei, Sado Island, collected by Kitami and Arimoto, May 2, 1970, 4 males, 2 females, Coll. no. 605; 1 male, 1 female, Coll. no. 498, 10 meters; Tassha Bay, Sado Island, collected by Kitami and Arimoto, May 2, 1970, 1 female, Coll. no. 431, 1 female, Coll. no. 409, 1 male, Coll. no. 436, 1 female, Coll. no. 451, 2 males, Coll. no. 467; Toda, Sado Island, collected by Kitami and Arimoto, May 3, 1970, 2 males, Coll. no. 621; Futami, Sado Island, collected by Kitami and Arimoto, May 3, 1970, 1 male, 2 females, Coll. no. 638.

DESCRIPTION: Male: Body length of specimen 7.5 mm (Text-fig. 67, A);

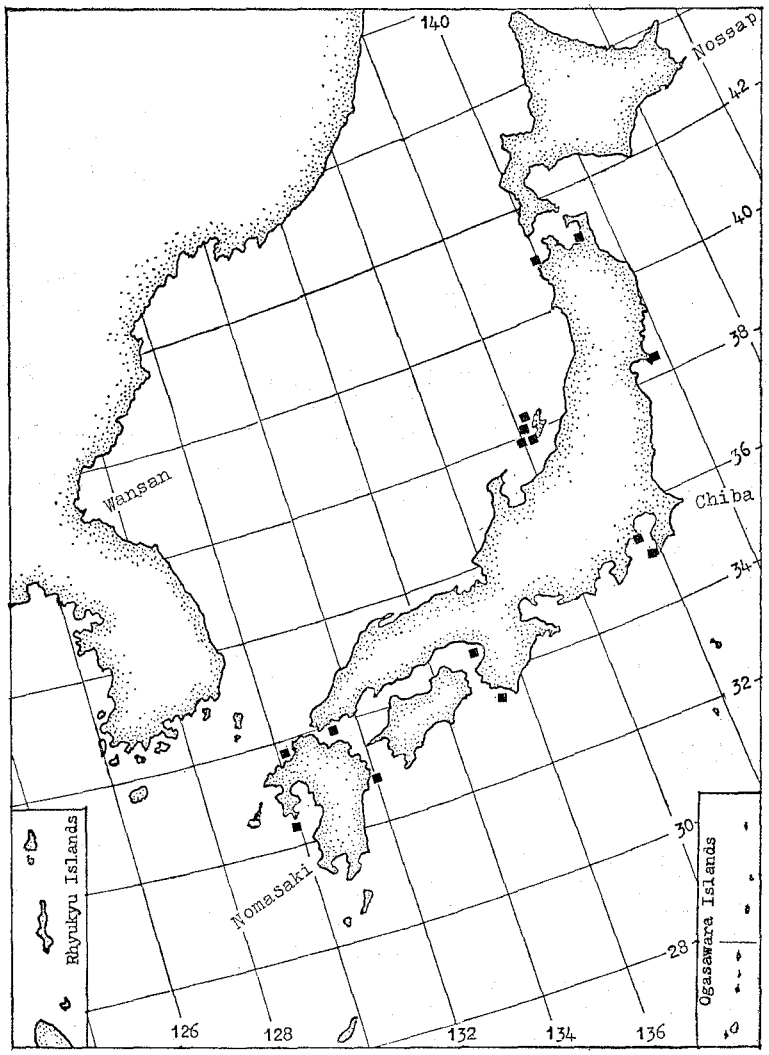

Fig. 68. Distrbution records of *Caprella (Spinicephala) verrucosa* Boeck around Japan.

pereonites II, III, IV and V subequal in length, VI and VII taken together about as long as V; head with median triangular spine pointed anteriorly, pereonite I with a single dorsal tooth at distal end, pereonite II with two large blunt and unpaired teeth dorsally, pereonite III with three unpaired teeth dorsally, pereonite IV with a pair of dorsal teeth at fore end, and also with two unpaired dorsal teeth at middle and hind end, pereonite V with one unpaired and three paired teeth dorsally, pereonite VI with two pairs of dorsal teeth, pereonite VII with a pair of dorsal teeth, pereonite III and IV having a large lateral tooth at the fore and hind end and the middle.

Antenna 1 a little longer than one-third of body length, peduncle segments 1 and 2 very short and rather plump, 3 shorter than 2 and suddenly narrowed, flagellum a little shorter than peduncle, and composed of 10–12 segments; antenna 2 longer than peduncle of antenna 1, flagellum with short setae. Gnathopod 2 attached to middle part of pereonite II, basal segment very short, propodus twice as long as its breadth, palm with proximal angle projection having setae, without any poison tooth medially, but a triangular tooth at distal angle to the palm.

Gills oblong.

Pereopods increasing in length from 5 to 7, propodus of palm concave, and grasping spines located proximally.

Young male: Body length of specimen 6.5 mm (Text-fig. 67, D); pereonites III and IV longer than any other, pereonite II shorter than III or IV; pereonite V shorter than II, pereonites VI and VII taken together a little longer than V; pereonites III and IV with two large unpaired blunt teeth dorsally, and pereonite V with two pairs of small dorsal teeth.

Peduncle of antenna 1 not plump like in adult, its flagellum 12-segmented.

Adult female: Body length of specimen 8 mm (Text-fig. 67, E); pereonite II the longest of all segments, pereonites III and IV a little shorter than II, pereonite V a little shorter than III; pereonite III and IV with unpaired dorsal teeth at middle and posterior end, and a pair of dorsal teeth at fore end, pereonite V with three pairs of dorsal teeth and two pairs of lateral teeth; flagellum of antenna 1, 10-segmented.

Young female: Body length of specimen 5 mm (Text-fig. 67, F); pereonite III longest of all segments, pereonite II a little shorter than III, IV a little shorter than II, V a little shorter than IV, VI a little shorter than V, VII a little shorter than VI and I shortest of all segments; pereonite III and IV each with a pair of small dorsal teeth at fore end, and unpaired dorsal teeth at middle and hind ends, large lateral tooth at hind end of pereonite III and fore end of pereonite IV, pereonite V with two pairs of dorsal teeth; flagellum of antenna 1, 10-segmented; gnathopod 2 attached to fore end of pereonite II, its propodus about twice as long as its greatest breadth, with a setiferous tooth at the base, palm rectangular and with setae, but without poison and angular tooth.

Gills elongate.

DISTRIBUTION: Type locality: California, probably near San Francisco.

Other records: Laguna Beach, Tomales Bay, Pescadero Point, Mission Point,

Santa Cruz, Santa Catalina, Pt. Reyes, and Pacific Grove, California.

Other localities around Japan: Misaki (Mayer, 1903: 33); Tateyama Bay (Arimoto, 1930: 49, Coll. no. 16); Onagawa (Utinomi, 1943: 274); Asamushi (Utinomi, 1947: 72); Okinoshima, Fukuoka Pref. (Utinomi, 1947: 72); Tomioka (Utinomi, 1947: 72); Off Aio-cho, (Yamaguchi Inland Sea Fish. Exp. St., 1968, Coll. no. 310); Kamae Bay (Utinomi, 1969: 305); Tassha Bay, Sado Island (Kitami and Arimoto, 1970, Coll. no. 409); Senkaku Bay, Sado Island (Kitami and Arimoto, 1970, Coll. no. 498); Toyoda Bay, Sado Island (Kitami and Arimoto, 1970, Coll. no. 621); Off Futami, Sado Island (Kitami and Arimoto, 1970, Coll. no. 638); Shiosaki, Kushimoto, attahed to the sea-star *Acanthaster planci*, 1 male, 1 female, III 15, 1973, Kenichi Hayashi, coll., Coll. no. 650-(4); Iki Island, 9.5 meter depth, 2 males, 1 female, J.I. Bruce coll., Coll. no. 652-(7); Takamatsu Bay, on *Sargassum*, 4 males, 2 females, XI, 1971, Takayuki Saegusa, coll., Coll. no. 666-(2); Hukaura, west coast of Aomori Pref. (Utinomi, 1973: 37); Susami, Wakayama Pref. (Utinomi, 1973: 37); Ohsaka Bay (Utinomi, 1973: 37).

Additional collections: Tateyama Bay (Arimoto, 1928, Coll. no. 60); Tateyama Bay (Yaichiro Okada, 1929, Coll. no. 94); Tassha Bay, Sado Island (Kitami and Arimoto, 1970, Coll. nos. 431, 436, 451 and 467); Senkaku Bay, Sado Island (Kitami and Arimoto, 1970, Coll. no. 605).

46. *Caprella (Spinicephala) septentrionalis* Kröyer, 1838

(Jap. name: *Hokkai-warekara* Arimoto, 1971)

Figs. 69, 70, 71, 72.

Caprella septentrionalis Kröyer, 1838, Danske Vidensk. Selsk. nat. math. Afhandl., 7: 318. —— Kröyer, 1843, Naturh. Tidsskr., 4 (6): 590–596, pl. 8 figs. 10–19. ——M. Sars, 1859, Forh. Vidensk. Selsk. Christiania, 1858: 150. ——Boeck, 1861, Forh. Skand. Naturf. Köbenhavn, 8: 677. ——Bate, 1862, Catal. Amphip. Crust. British Mus. 27.3 meters, 355, pl. 56 fig. 3. ——Goës, 1866, Svenska. Vetensk. Akad. Forh., 22 (8): 534. ——Packard, 1867, Mem. Boston Soc. nat. Hist., 1: 297. ——Boeck, 1871, Forh. Vidensk. Selsk. Christiania, 1871: 276 (196). ——Lütken, 1875, in Jones, Man. nat. Hist. Geol. Greenland: 159. ——Schiödte, 1875, Naturh. Tidsskr., (3) 10: 224, pl. 5 figs. 1–8. —— Boeck, 1876, Skandinaviske Amphipoder: 696–698. ——Norman, 1876, in Jeffieys, Proc. Roy. Soc. London, 25 (173): 209. ——Miers, 1877, Ann. Mag. nat. Hist., (4) 19: 139. ——Meinert, 1877, Naturh. Tidsskr., (3) 11: 171–172. ——Meinert, 1880, Naturh. Tidsskr., (3) 12: 495. ——Miers, 1880, Journ. Linn. Soc. London, (Zool.), 15: 69. ——Hock, 1882, Niederl. Arch. Zool. (suppl.), 1 (7): 65. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 62–64, figs. 20–22. ——Stuxberg, 1882, in Nordenskiöld, Vega-Exped. Vetensk. Iakttagelser., 1: 764. ——Sparre Schneider, 1883, Tromsö Mus. Aarsb., 6: 30. —— Sparre Schneider, 1884, Tromsö Mus. Aarsh., 7: 130–131. ——Koelbel, 1886, Beobacht. Ergebn. Akad. Wiss., 3 (6): 42. ——Norman, 1886, Museum Normanianum, (ed. 1) 3: 17. ——G.O. Sars, 1886, Norwegian North-Atlantic Exped., (Crust.) 2: 69, 89. ——Hansen, 1887, Vidensk. Medd. naturh. Foren. Köbenhavn, (4) 9: 173–174. ——Stuxberg, 1887, in Nordenskiöld, Vega-Exped. Vetensk. Iakttagelser, 5: 73. ——Vosseler, 1889, Arch. Naturgesch., 55 (1): 159. ——Pfeffer, 1890, Jahrb. wiss. Anst. Hamburg, 7: 87, 94. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 65–68, pl. 2 figs. 26–33, pl. 4 fig. 31, pl. 6 fig. 38. ——Meinert, 1890, Vidensk. Udb. Hauchs Togter: 184–185. ——Sparre Schneider, 1891, Tromsö Mus. Aaish., 14: 111, 122. ——Klinckowström, 1892, in Nordenskiöld, Bih. Svenska Vetensk. Akad. Handl., 17 (2) (3): 90. ——Ohlin, 1895, Lund Univ. Aarsskr., 31: 17, 19, 63–64. ——Ohlin, 1895, Zool. Anz., 18 (492): 486. ——G.O. Sars, 1895, Account Crust.

Norway, 1: 659–660, 700, pl. 237 fig. 1. ——Vanhöffen, 1897, Grönland Exped. Gesellsch. Erdkunde Berlin, 2 (1): 202, 203, 213. ——Scott, 1899, Journ. Linn. Soc. London, 22 (174): 81. ——Scott, 1901, Ann. Rep. Fish. Bd. Scotland, 19 (3): 267–268. ——Ortmann, 1901, Proc. Acad. nat. Sci. Philadelphia, 53: 155–156. ——d' A.W. Thompson, 1901, Catal. Crust. Mus. Dundee: 42. ——Norman, 1902, Ann. Mag. nat. Hist., (7) 10: 483. ——Lönnberg, 1903, Medd. Landtbrukst., 2 (80): 50. ——Mayer, 1903, Siboga Exped. Mon., 34: 120–123, pl. 5 figs. 19–21, pl. 8 fig. 24. ——Holmes, 1905, Bull. United States Bur. Fish., 24: 527, 1 fig. ——Norman, 1905, Museum Normanianum, (ed. 2) 3: 26. ——Nordgaard, 1905, Hydrogr. biol. Invest. Norwegian Fiords: 185. ——M.J. Rathbun, 1905, Occ. Pap. Boston Soc. nat. Hist., 7: 7, 78–79. ——M. J. Grieg, 1907, in Orléans, Crois. océan. Belgica: 527. ——Von der Brüggen, 1909, Mém. Acad. Sci. St. Petersburg, (8) 18 (16): 43. ——Stephensen, 1913, Medd. Grönland, 22 (1): 223–225. ——Stephensen, 1913. Medd. Grönland, 51 (1) (3): 68. ——Björck, 1915, Lund. Univ. Aarsskr., (n. ser.) 11 (7): 36. ——Derjugin, 1915, Mém. Acad. Sci. Petersbourg, (8) 34 (1): 453, 456. ——Stephensen, 1916, Medd. Grönland, 53: 295. ——Oldevig, 1917, Svenska Vetensk. Akad. Handl., 54 (8): 40. ——Sparre Schneider, 1926, Tromsö Mus. Aarsh., 47 (8): 60. ——J.A. Grieg, 1925, Bergens Mus. Aarb., 1923–1924 (9) (2): 22. ——Johansen, 1925, Canadian Field Nat., 39 (9): 204. ——Shoemaker, 1926, Contr. Canadian Biol., 3 (1): 11. ——Stephensen, 1927, Vidensk. Medd. Dansk Naturh. Foren., 84: 148–149. ——Stephensen, 1927, Tromsö Mus. Skr., 1 (5): 13. ——Derjugin, 1928, Explor. Seas USSR, 7–8: 282. ——Stephensen, 1928, Danmarks Fauna, 32: 384–386, fig. 92 (5–10). ——Gurjanova, 1929, Trans. Inst. sci. Explor. North, 43: 70. ——Stephensen, 1929, Tierwelt Nord-Ostsee, 10 (f): 179–180, figs 43–334. ——Stephensen, 1929, Zoology Faroes, 23: 20, 34. ——Johansen, 1920, Canadian Field Nat., 44 (4): 94. ——Shoemaker, 1930, Contr. Canadian Biol., (n. ser.) 5 (10); 353 (135)–345 (136). ——Gurjanova, 1931, Trans. Inst. sei. Explor. North, 48: 201. ——Oldeving, 1933, Göteborgs Vetensk. Samh. Handl., (B) 3 (4): 266–269, figs. 1–2 (p. 267), figs. 1–3 (p. 268). ——Stephensen, 1933, Medd. Grönland, 79 (7): 60, 77. ——Chevreux, 1935, Rés. Camp. sci. Monaco, 90: 133. ——Dons, 1935, Norske Vidensk. Selsk. Forh., 7 (30): 110. ——Stephensen, 1935, Norske Vidensk. Selsk. Forh., 7 (32): 118. ——Stephensen, 1940, Zool. Iceland, 3 (26): 73–74. ——Dunbar, 1942, Canadian Journ. Res., 20 (D): 42. ——Stephensen, 1942, Tromsö Mus. Skr., 3 (4): 439–441, 502, 503. ——Schellenberg, 1942, Tierw. Deutschlands, 40: 238, fig. 198. ——Utinomi, 1943, Jou. Fac. Sci. Hokkaido imp. Univ., (6), 8 (3): 296–297, fig. 10. ——Stephensen, 1944, Medd. Grönland, 121 (14): 136–137, 148, 159, 162. ——Dahl, 1946, Lund Univ. Aarsskr., (n. ser.) (2) 42 (16): 78. ——Stock and Bloklander, 1952, Beaufortia, 1 (10. 4. ——Dunbar, 1954, Journ. Fish. Res. Bd. Canada, 11 (6): 784, 788. ——Bousfield, 1956, Proc. Nova Scotian Inst. Sci., 24 (1): 32. ——Bousfield, 1956, Bull. nat. Mus. Canada, 142: 144. ——Bousfield, 1958, Proc. Nova Scotian Inst. Sci., 24 (3): 321. ——Bousfield and Leim, 1958, Bull. nat. Mus. Canada, 166: 18. ——Brunel, 1961, Cahiers inform. Sta. biol. mar. Grande-Rivière, 7: 7. ——Bousfield, 1962, Bull. nat. Mus. Canada, 183: 53. ——Préfontaine and Brunel, 1962, Canadian Nat., 89 (8–9): 256. ——McCain, 1968, Bull. United States Nat. Mus., 278: 44–49, figs. 19–22, 51. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 39. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 45. ——Utinomi, 1973, Bull, Biogeogr. Soc. Japan, 29 (5): 35.

Caprella Septentrionalis Herklots, 1861, Tijdschr. Entomol., 4: 43.

Caprella cerocopoides White, 1852, in Sutherland, Voy. Baffin's Bay Barrow Straits, 2: ccvii, fig. 1. Type locality: 73°16′ N., 57°16′ W., West Greenland, 2–40 meters.

(?) *Caprella hystrix* (not Kröyer, 1843), Bate and Westwood, 1868, Hist. British Crust., 2: 63–64. ——M'Intosh, 1874, Ann. Mag. nat. Hist., (4) 14: 272. ——M'Intosh, 1875, Mar. Invert. Fish. St. Andrews: 149. ——Koehler, 1885, Bull. Soc. Sci. Nancy, (2) 7 (17): 112, 117. ——Koehler, 1885, Ann. Sci. nat. Paris, (Zool.) (6) 20: 54, 61. ——Bate, 1888, in Heape, Journ. mar. biol. Ass. United Kingdom, 1 (2): 175. ——Bonnier, 1887, Bull. Sci. Dept. Nord, 10: 354. ——Robertson, 1888, Proc. Trans. nat. Hist. Soc. Glasgow, (n. ser.) 2 (1): 72. ——Walker, 1895, Ann. Mag. nat. Hist., (6) 15: 475. ——Norman, 1905, Ann. Mag. nat. Hist., (7) 16: 85. ——Norman and Scott, 1906, Crust. Devon Cornwall: 99.

(?) *Caprella hystryx* Bate, 1878, in Couch., Journ. Roy. Inst. Cornwall, 19: 509.

Caprella lobata (not O.F. Müller, 1776), Kröyer, 1843, Naturh. Tidsskr., 4 (6): 596–603, pl. 7 figs. 24–28 (in part, var. β). ——Snellen van Vollenhoven, 1860, Dieren van Nederland, Gelede

Dieren: 27, 1 fig.

Caprella longicornis Boeck, 1871, Forh. Vidensk. Selsk. Christiania, 1871: 274 (194).–275 (195). ——Boeck, 1876, Skandinaviske Amphipoder: 691–693, pl. 32 fig. 7. Type locallity: "Ad oras occidentales, Norvegiae".

Caprella Lovéni Boeck, 1871, Forh. Vidensk. Selsk. Christiania, 1871: 276 (196). ——Boeck, 1876, Skandinaviske Amphipoder: 694–696, pl. 32 fig. 8. ——Meinert, 1877, Naturh. Tidsskr., (3) 11: 171. ——G.O. Sars, 1895, Account Crust. Norway, 1: 662–663, pl. 238 fig. 2. ——Stephensen, 1928 Danmarks Fauna, 32: 385–386, fig. 92 (10). Type locality: "Ad oras occidentales, Norvegiae".

Caprella lovéni Stephensen, 1940, Zool. Iceland, 3 (26): 74. ——Stephensen, 1942, Tromsö Mus. Skr., 3 (4), 3 (4): 441, 504, 505. ——Stephensen, 1944, Medd. Grönland, 121 (14): 159.

Caprella monocera G.O. Sars, 1895, Account Crust. Norway, 1: 661–662, pl. 238 fig. 1. ——Ohlin, 1895, Lund Univ. Aarsskr., 31: 8, 13, 17, 19, 64–65. ——Nordgaard, 1905, Hydrogr. biol. Invest. Norwegian Fiords: 185. ——Stephensen, 1928, Danmarks Fauna, 32: 385, fig. 92. ——Stephensen, 1933, Medd. Grönland, 79 (7): 60, 77. ——Stephensen, 1940, Zool. Iceland, 2 (26): 74. ——Stephensen, 1942, Tromsö Mus. Skr., 3 (4): 442, 504, 505. ——Stephensen, 1944, Medd. Grönland, 121 (14): 159.

Caprella punctata (not Risso, 1816) Boeck, 1861, Forh. Skand. Naturf. Köbenhaven, 8: 676–677. ——Boeck, 1871, Forh. Vidensk. Selsk. Christiania, 1871: 277 (197). ——Boeck, 1876, Skandinaviske Amphipoder: 698–699, pl. 32 fig. 11. ——G.O. Sars, 1886, Norwegian North-Atlantic Exped. 1876–1878, (Crust.) 2: 69, 89. ——G.O. Sars, 1895, Account Crust. Norway, 1: 660–661, 700–701, pl. 237 fig. 2, pl. 8 fig. 3. ——Norman, 1905, Museum Normanianum, (ed. 2) 3: 26. ——Von der Brüggen, 1907, Ann. Mus. zool. Acad. Sci. St. Petersbourg, 11: 238. ——Nordgaard, 1912, Norsk. Vidensk. Selsk. Skr., (6): 24. ——Stephensen, 1928, Danmarks Fauna, 32: 385, fig. 92 (8). ——Stephensen, 1933, Medd. Grönland, 79 (7): 60, 77. ——Stephensen, 1940, Zool. Iceland, 3 (26): 74. ——Stephensen, 1942, Tromsö Mus. Skr., 3 (4): 442–443, 504, 505. ——Stephensen, 1944, Danish Ingolf-Exped., 3 (13): 50. ——Stephensen, 1944, Medd. Grönland, 121 (14): 159. ——McCain, 1966, Galathea Rep., 8: 92. Type localities: "Throndhiemsfiorden, Sondmör (=Sunnmöre, prov. Romsdal) og Manger (near Bergen)" all three localities in Norway.

Caprella robusta (not Dana, 1853) Stimpson, 1853, Smithsonian Contr. Knowl., 6: 44. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 66. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 73. Type locality: "Back of Duck Island ledge", Grand Manan Island, Bay of Fundy, New Brunswick, Canada; "rocky bottom, in 12 fathoms".

(?) *Caprella septentrionalis* Hirosaki, 1964, Misc. Rep. Inst. nat. Resources, 62: 68.

Caprella stimpsoni Holmes, 1905, Bull. United States Bur. Fish., 24: 527, 1 fig.

Caprella Stimpsoni Bate, 1862, Catal. Amphip. Crust. British Mus.: 361. ——Whiteaves, 1901, Canada Geol. Surv., (722): 220. Replacement name for *Caprella robusta* Stimpson, 1853 (not Dana, 1853).

Caprella septentrionalis f. *longicornis* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 66, pl. 2 figs. 26–27, 33, pl. 4 fig. 31.

Caprella septentrionalis longicornis M.J. Rathbun, 1905, Occ. Pap. Boston Soc. nat. Hist., 7: 7, 78–79.

Caprella septentrionalis lovéni Stephensen, 1929, Tierwelt Nord-Ostsee, 10 (f): 180, fig. 334.

Caprella septentrionalis f. *lovéni* Oldevig, 1933, Göteborgs Vetensk. Samh. Handl., (B) 3 (4): 266, fig. 2 (p. 268).

Caprella septentrionalis f. *monocera* Oldevig, 1933, Göteborgs Vetensk, Samh. Handl., (B) 3 (4): 266, fig. 2 (p. 267).

Caprella septentrionalis monocera Stephensen, 1929, Tierwelt Nord-Ostsee, 10 (f): 180, fig. 334.

(?) *Caprella septentrionalis* f. *nodigera* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 66. Type localities: Millport, Northumberland and Plymouth, England.

(?) *Caprella septentrionalis* f. *parva* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 66, pl. 2 figs. 28–31. Type locality: Tsugaru Straits, Japan.

Caprella septentrionalis polyceros M.J. Rathbun, 1905, Occ. Pap. Boston Soc. nat. Hist., 7: 7, 79.

Caprella septentrionalis f. *polyceros* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 66, pl. 2 fig. 32. Type locality: Eastport, Maine.

Caprella septentrionalis punctata, Stephensen, 1929, Tierwelt Nord-Ostsee, 10 (f): 180, fig. 334.

Caprella septentrionalis f. *punctata* Oldevig, 1933, Göteborgs Vetensk. Samh. Handl., (B) 3 (4): 266, fig. 3 (p. 268).

Caprella septentrionalis f. *robusta* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 67.

Caprella septentrionalis stimpsoni M.J. Rathbun, 1905, Occ. Pap. Boston Soc. nat. Hist., 7: 7, 79.

Caprella septentrionalis f. *typica* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 66. Type localities: Several localities: Several localities in North Atlantic Ocean including Iceland, Jan Mayen, Spitzbergen, Faeroe Islands.

Squilla lobata (not O. F. Müller, 1776), O. Fabricius, 1780, Fauna Groenlandica: 248–249.

No specimen in the author's collection.

OCCURRENCE: Tsugaru Straits, Mayer, 1890: 68, 183 meters; Muroran, collected by Iwasa, Aug. 11, 1934, attached to sea-weed, 1 female, Utinomi, 1943: 292; (?) Sagami Bay, Hirosaki, 1968: 68.

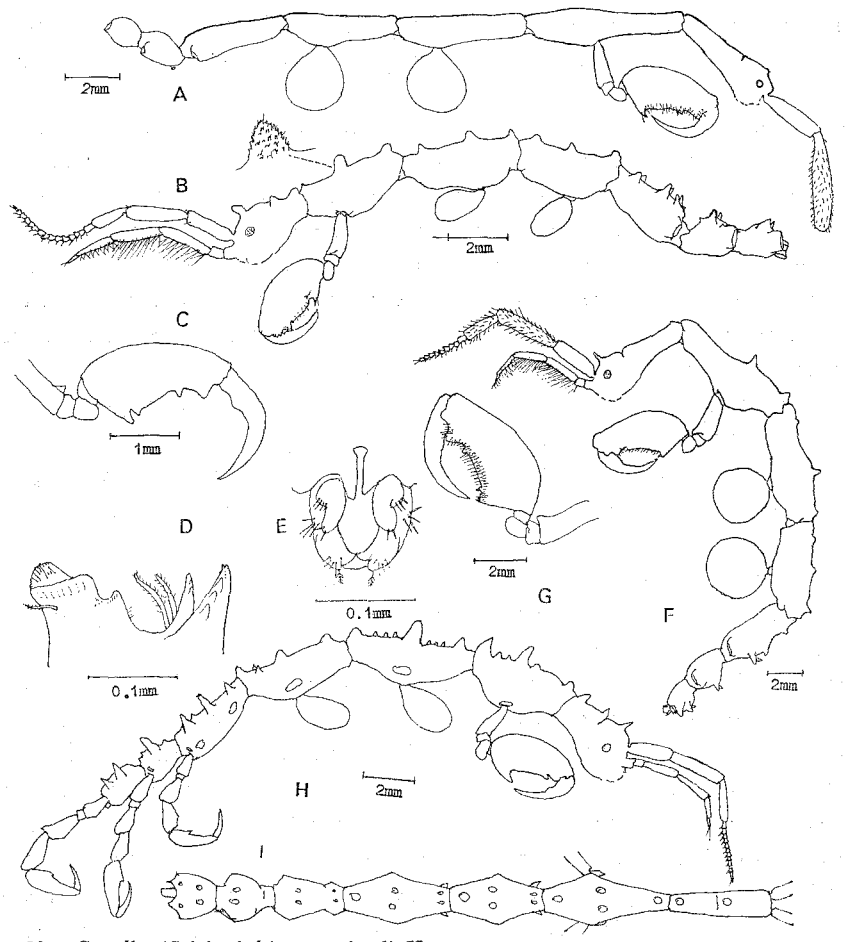

Fig. 69. *Caprella* (*Spinicephala*) *septentrionalis* Kröyer.
A, adult male (after Sars., 1895); B, adult male (after McCain, 1968); C, propodus of gnathopod 2 of f. *longicornis* (after Mayer, 1890); D, mandible; E, abdomen of male; F, adult male of f. *longicornis*; G, propodus of gnathopod 2 of f. *longicornis*; (D-G, after McCain, 1968); H, adult male of f. *polyceros*; I, dorsal view of young male of f. *parva* (H-I, after Mayer, 1890).

DESCRIPTION: With reference to McCain's description (1968: 44).

Male: Body length of adult specimen 20 mm (Text-fig. 69, B), with numerous spines and tubercles; pereonites II and III subequal in length, and longer than any other segment, pereonite IV a little shorter than III, V a little shorter than IV, VI and VII taken together about as long as V, I a little shorter than head; head with a long obtuse prominence bent forward, pereonite I narrow and short with a dorsal tubercle at fore and hind end, pereonite II with a pair of dorsal tubercles at middle, and a tubercle at fore and hind ends, pereonites III and IV each with two pairs of dorsal tubercles at middle and fore part, a tubercle at hind end, and also with a lateral tooth at fore end and hind corner, pereonite V with three pairs of dorsal tubercles, one on middle, two on respectively fore and hind ends, pereonites VI and VII each with a pair of dorsal tubercles.

Antenna 1 shorter than half of body length, its flagellum shorter than peduncle and composed of 15 segments; antenna 2 slightly longer than peduncle of antenna 1.

Incisor of mandible divided into 5 teeth, lacinia mobilis slightly toothed, setal row of 2 or 3 plumose setal, prominent molar with strongly denticulate crown; outer lobe of maxilla 1, with 7 fork-like bifid strong teeth at apex, segment 1 of palp short, segment 2 a little longer than outer lobe, and a strongly dentate apex carries about 7 spine teeth, and with a couple of setiform spines on surface below these; inner lobe of maxilliped scarcely reaches base of segment 1 of palp, with several feathered spines at inner margin, outer lobe a little longer than inner lobe, and with several spines at inner margin, palp typical of the genus.

Gnathopod 2 attached to middle part of pereonite II, its segment 1 shorter than half of pereonite II, propodus with proximal palmar spine, and subpalmar spine, a small poison tooth and triangular tooth on inner surface, distally with small teeth notches, and rectangular projection, distal margin occasionally with projections, base short and robust.

Gills usually elliptical, occasionally oval and inflated.

Propodus of pereopods 5–7 each with a pair of proximal grasping spines.

Abdomen typical of the genus.

Female: Body length of adult specimen 20 mm (Text-fig. 71, Q); pereonites II and III subequal in length and the longest of all segments, IV a little shorter than III, V a little shorter than IV, VI and VII taken together a little shorter than V, I a little shorter than head; head with a long obtuse prominence bent forward behind eye, pereonite I narrow, short, with a tubercle at hind end and fore end, pereonite II with three pairs of dorsal tubercles, pereonite III with three pairs of dorsal tubercles, pereonite IV with four pairs of dorsal tubercles, and with a lateral tooth on the hind part, pereonite V with three pairs of dorsal tubercles, pereonites VI and VII each with a pair of dorsal tubercles.

Flagellum of antenna 1, 11-segmented; gnathopod 2 attached to rather front part of pereonite II, propodus roughly oval, with fore and hind margins evenly convex, a spine-bearing process of palmar proximally and a rudimentary poison

tooth distally, distal angle of palm slightly protuberant; gills small, oval and bent forward; pereopods 5–7 moderately narrow, propodus short, clasping spines located proximally on palm.

Variation: Body spination varies from quite spinose to almost as smooth as in *C. linearis*, usually head has a single spine.

Sars's specimen (1895: 658, Text-fig. 69, A): Having smooth back, or with only slight traces of obtuse tuberculiform prominences; pereonite I in male considerably more pronouced than in female, pereonite II longer than III; flagellum of antenna 1 of female composed of about 16 segments; propodus of gnathopod 2 of male large and rather broad at base, tapering distally, palmar angle, poison tooth and triangular tooth rather projecting, dactylus very strong and abruptly curved in its outer margin; gills of moderate size and ovate in form in female, very large and rounded oval in male.

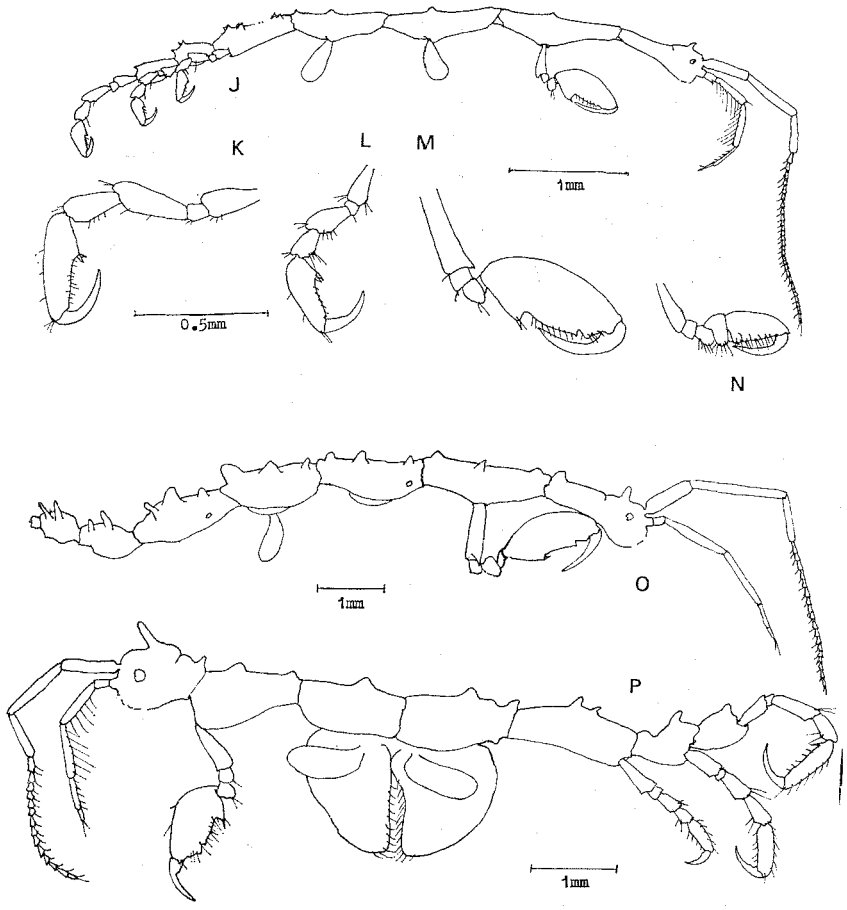

Fig. 70. *Caprella* (*Spinicephala*) *septentrionalis* Kröyer.
J, young male of f. *monoceros*: (after Sars, 1895); K, pereopod 7; L, pereopod 5; M, gnathopod 2 of f. *monoceros*; N, gnathopod 1 of f. *monoceros*; O, male of f. *parva*; (K-O, after Mayer, 1890); P, adult female of in Japan (after Utinomi, 1943).

This form first described by Kröyer under the above name is distinct from others by the presence of dorsal tubercles, and more particularly, by rather different structure of propodus of gnathopod 2 in male.

Caprella septentrionalis f. *longicornis*: With reference to McCain's description, 1968: 45.

Male: Body length of specimen 27 mm (Text-fig. 69, F); pereonite I considerably more pronounced than in female, pereonite II longer than III, pereonite II with two pairs of dorsal tubercles, pereonite V with two pairs of dorsal tubercles; gills of moderate size and rounded oval in male; flagellum of antenna 1 composed of 9–10 segments.

Caprella septentrionalis f. *loveni*: With reference to Sars description, 1895: 662.

Male: Body unusually short and robust, with back smooth or only exhibiting slight traces of tubercles; pereonite II scarcely longer than III; antenna 1 comparatively short, and its peduncle somewhat expanded and finely ciliated on edges, flagellum composed of about 11-segmented; gnathopod 2 likewise unusually stout,

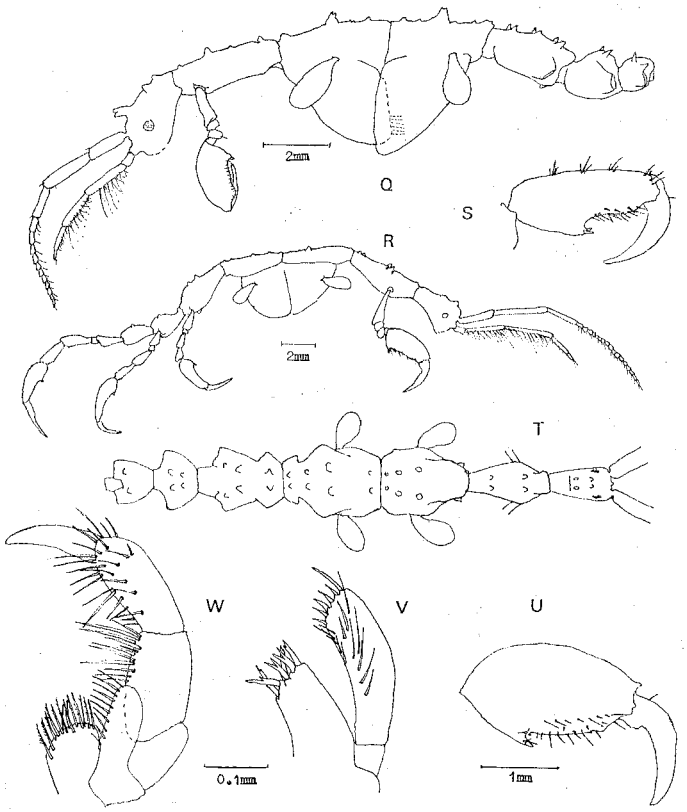

Fig. 71. *Caprella* (*Spinicephala*) *septentrionalis* Kröyer.
Q, adult female: (after McCain, 1968); R, adult female: (after Mayer, 1890); S, propodus of pereopod 7: (after McCain, 1968); T, dorsal view of young female; U, propodus of gnathopod 2 of female; (T-U, after Mayer, 1890); V, maxilla 1; W, maxilliped (V-W, after McCain, 1968).

propodus very large and broad at base, palm densely hairy, and produced in front to triangular lappet followed by a dentiform projection.

The above-characterized form undoubtedly conforms to that described by Boeck as *C. septentrionalis* f. *longicornis* (Text-fig. 69, F).

Caprella septentrionalis f. *monocera*: After f. *monocera* of Sars, 1895: 661.

Body extremely slender and elongated, especially in male, with scattered small tubercles dorsally, attaining the length of 5 mm (Text-fig. 70, J); head with a single corniform tubercle, pereonite II-IV each with a single dorsal tubercle about in middle, and pereonite V with 3 pairs of small dorsal tubercles; flagellum of antenna 1 exceeding in length peduncle, and composed of about 20 segments in female, but in male composed of as many as 30 segments; antenna 2 scarcely half as long as 1; gnathopod 2 strong, propodus oblong oval in form, having palm divided in front into poison tooth and triangular tooth, and palmar projection proximally.

Sars mentioned in 1895 that, "I cannot identify this form with any of earlier described species. It is somewhat intermediate in character between *C. septentrionalis* and *C. microtuberculata*, yet differing from either of them in several points. I may chiefly recognized it by its extremely slender and narrow body, comparatively elongated superior antennae, and acute, undivided cephalic tubercle".

Caprella septentrionalis f. *nodigera*: After Mayer, 1890: 66.

Body length about 20 mm, very plump and with dorsal tubercles; flagellum of antenna 1, 14-segmented.

Caprella septentrionalis f. *parva*: After Mayer, 1890: 66, figs. 4, 6, 9.

Body with single or pair of dorsal tubercles; flagellum of antenna 1, 17-segmented; body length about 14 mm in male, 10 mm in female.

Caprella septentrionalis f. *polyceros*: After Mayer, 1890: 66.

Body length 23 mm (Text-fig. 69, H), having many large dorsal unpaired tubercles on pereonites II, III and IV, but paired ones on pereonites V-VII, and a tubercle above gill; flagellum of antenna 1, 15-segmented.

Caprella septentrionalis f. *punctata*: After Sars, 1895: 660.

Female: Body comparatively strongly built and coarsely spinous, some of spines arranged along back considerably larger than others, head having a large somewhat flattened tubercle, bifurcate (or some times tripartite) above in front of cervical impression, at tip, and behind the same; pereonite III with spiniform tubercles, II with anterior one juxtaposed, IV and succeeding segments with about 3 more conspicuous dorsal spines; antenna 1 but little exceeding one-third of body length, its flagellum composed of about 15 segments; gnathopod 2 partly covered with small tubercles, propodus very large, oval in form, with several distinct tubercles above, palm with angular tooth in front succeeded by small, dentiform projection, defining angle rather prominent and tipped by strong spine; 3 pairs of pereopods strong and partly tubercular, propodus much dilated in middle, and palm comparatively short, defining angle rather projecting, and armed with 2 spines. Body length of adult female 15 mm.

Sars mentioned in 1895: 660, that, "This species established by Boeck, is nearly

allied to *C. septentrionalis*, and is considered by Mayer to be only a variety of this form. I have never, however, among numerous arctic specimens examined of the above-named species, found any attempt to the peculiar spinuous armature distinguishing the present species, and as there are also some differences in the structure of the several appendages, I have felt justified in maintaining this form as a distinct species. Meinert would also seem to have some doubt about the identification made by Mayer. According to Boeck, the male does not differ much from the female; but it is most probable, that he has only examined young, not yet sexually developed males".

Caprella septentrionalis f. *robusta*: After Stimpson, *C. robusta* 1853: 44.

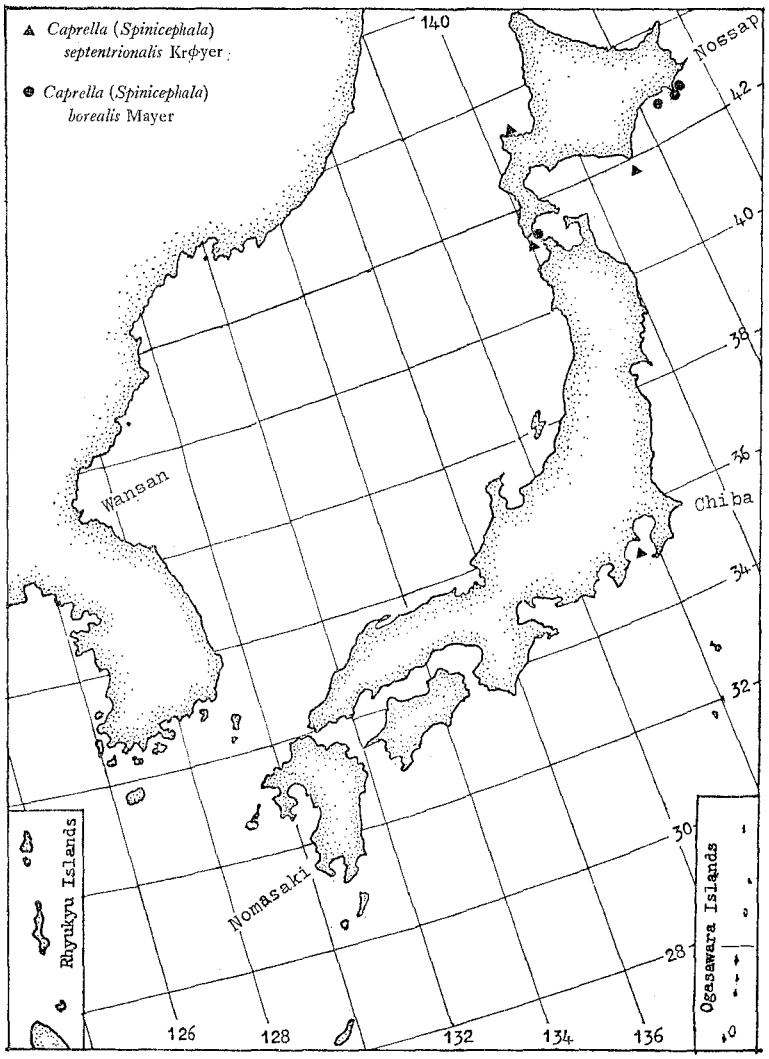

Fig. 72. Distribution records of *Caprella (Spinicephala) septentrionalis Kröyer* and *Caprella (Spinicephala) borealis* Mayer around Japan.

Body very large, thick and robust, there are numerous short spines on back; antenna 1 about half of body length; propodus of gnathopod 2 with strong teeth on lower edge, and short thick nails. Body length excluding antennae 32 mm, breadth 2.5 mm.

Caprella septentrionalis f. *typica*: After Mayer, 1890: 66.

Body length 16 mm; flagellum of antenna 1, 22-segmented; gills long.

DISTRIBUTION: Type locality: Greenland Seas.

Other records: Franz-Josefsland (77°53′ N., 53°20′ E., 236.6 meters; 72°45′ N., 56°50′ W., 27.3 meters); Spitzbergen, 3.64–36.4 meters; Murman Coast; Novaya Zemlya, White Sea; N. Russia; Norway to France and British Isles; Faeroe Islands; Jan Mayen; Iceland; East and West Greenland; Baffin Bay and Davis Straits; East Coast of North America from Hudson Bay to Georges Bank.

Other localities around Japan: Tsugaru Straits, 182 meters (Mayer, 1890: 65); Muroran (Utinomi, 1943: 296); (?) Sagami Bay on drift algae (Hirosaki, 1964: 68); Osyoro Bay, Hokkaido (Utinomi, 1973: 35).

47. *Caprella* (*Spinicephala*) *borealis* Mayer, 1903

(Jap. name: *Igakobu-warekara* Arimoto, 1971)

Figs. 72, 73.

Caprella acutifrons f. *borealis* Mayer, 1903, Siboga Exped. Mon., 34: 83–84, pl. 3 figs. 5–6.

Caprella borealis Utinomi, 1943, Journ. Fac. Sci. Hokkaido imp. Univ., 6, 8 (3): 287–289, fig. 4. ——Utinomi, 1947, Seibutsu (suppl.), 1: 73. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 13. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 14.

OCCURRENCE: Kushiro Bay, collected by Shiro Komamura, Apr. 1, 1937, attached on sea weed, 1 male, Coll. no. 115; Tsugaru Straits, 41°20′ N., 140°15′ E., collected by T/S Sōyō-maru of Fisheries Experimental Station of Department of Agriculture and Forestry, Aug. 23, 1930, depth 269 meters, by dredge, 1 male, Coll. no. 121; Akkeshi Bay, collected by Zen Nagao, Aug. 6, 1967, 1 male, 2 females, Coll. no. 251.

DESCRIPTION: Male: Body length of adult specimen 12 mm (Fig. 73, A); body rather slender, tuberculated; pereonite II the longest of all segments, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, VI and VII taken together a little shorter than III, I a little shorter than head; head with a blunt tubercle curved slightly forward above eye, pereonite I with a slight tubercle raised at hind end, pereonite II broadened backward, and indistinct tubercle on back, pereonite III provided with three pairs of dorsal tubercles arranged at similar intervals and with two ventrolateral tubercles at fore end, and one tubercle at hind end, pereonite IV abruptly constricted slightly in front of hind end, and provided with three pairs of dorsal tubercles, pereonite V with two pairs of small tubercles on back, pereonites VI and VII diminishing in size backwards and each with a pair of small dorsal tubercle.

Antenna 1 nearly one-third as long as body, three segments of peduncle very

plump, flagellum slender, and a little shorter than peduncle, and 9-segmented; antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached to middle part of pereonite II, segment 1 a little shorter than half of pereonite II, and plump and somewhat quadrate distally, propodus about twice as long as segment 1, and nearly half as wide as long, with convex outer margin, small tubercles at base and near fore angle of palmar margin, but devoid of palmar spines and poison tooth; gills small, oval and attached a little behind middle of pereonite III and IV; on pereopods 5–7, no clasping spines of propodus on palmar margin.

Abdomen with penes medial, distal segment of appendage long.

Female: Body length of adult specimen 8 mm (Fig. 73, E); pereonites III

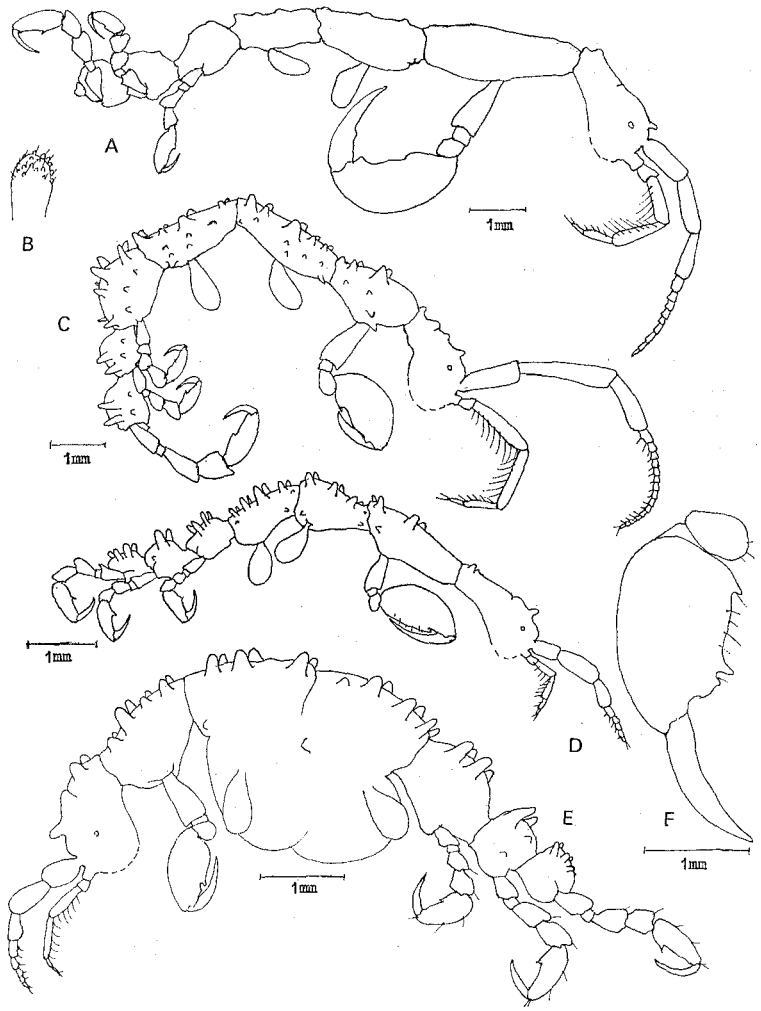

Fig. 73. *Caprella* (*Spinicephala*) *borealis* Mayer.
A, adult male (from Kushiro, Coll. no. 115); B, a projection of back of body; C, adult male (from Tsugaru Straits, Coll. no. 121); D, young male (from Akkeshi Bay, Coll. no. 251); E, adult female (from Akkeshi Bay, Coll. no. 251); F, propodus of gnathopod 2 of female.

and IV subequal in length, and the longest of all segments, II a little shorter than III, V a little shorter than IV, VI and VII taken together as long as V, I subequal to half of head length; head with a blunt tooth curved slightly forward above eye, pereonite I with a pair of big teeth on the back, pereonite II with four pairs of teeth on the back, pereonite III with three pairs of teeth on the back, pereonite IV with four pairs of teeth on the back, III and IV both with a pair of lateral processes on each lateral side of front margin, pereonite V with two pairs of teeth on the back, pereonite VI and VII with 2 or 3 pairs of teeth on the back.

Antenna 1 short and plump, and about one-fourth of body length, its flagellum very short and 5-segmented; antenna 2 longer than peduncle of antenna 1; eye very small; gnathopod 2 attached to about the middle of pereonite II, propodus a little shorter than twice of its breadth, proximally with slightly projecting palmar angle, poison tooth situated on nearly fore end angle of palm, distal angle of the palm with a square tooth.

GROWTH: Adult male: Body length 10 mm (Text-fig. 73, C): Many teeth arranged on all segments of the back, end of fore part of back has a projection, pereonite I with two projections at the front and end of back, pereonite II with two pairs of dorsal teeth and three lateral processes, pereonite III with five pairs of dorsal teeth and five lateral processes and a projection on each lateral side of front margin and posterior margin, pereonite IV with four pairs of teeth on back and five lateral processes on lateral side, and a process in fore part and distal end on each side, pereonite V with four teeth on back, and three processes on lateral side, pereonite VI and VII each with two pairs of teeth on back, and several lateral processes.

Antenna 1, a little longer than half of body length, with its flagellum 15-segmented; gnathopod 2 attached rather to front part of pereonite II, propodus a little shorter than pereonite II, and a little longer than twice of its breadth, proximally with a slightly projecting palmar angle bearing a spine, poison tooth small.

Young male: Body length 7.5 mm (Fig. 73, D); pereonite I a little longer than head, with a projection on hind end of the back, pereonite III with three pairs of teeth on the back, pereonite V with two pairs of teeth on the back, pereonite VI and VII each with one or two pairs of teeth on the back.

Antenna 1 short and plump, about one-fourth of body length, its flagellum 5-segmented; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to approximately the rear part of pereonite II, its segment 1 short, about one-fourth of pereonite II, propodus a little shorter than pereonite II, with poison tooth distally.

DISTRIBUTION: Type locality: Cape Lopatka, Kamchatka.

Other localities around Japan: Akkeshi Bay (Utinomi, 1943: 289); Kushiro Bay (Arimoto, 1971: 14).

Additional collection: Akkeshi Bay (Arimoto, 1967, Coll. no. 251, coll. by Zen Nagao).

New locality: Tsugaru Straits (Arimoto, 1930, Coll. no. 121, coll. by Sōyō-maru).

48. *Caprella (Spinicephala) chelimana* Mayer, 1903

(Jap. name: *Tsubamenote-warekara* Arimoto, 1971)

Fig. 74.

Caprella chelimana Mayer, 1903, Siboga Exped. Mon., 34: 96–97, pl. 3 figs. 43–44, pl. 8 figs. 1–2. ——Utinomi, 1947, Seibutsu (suppl.), 1: 73. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 15. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 14.

No specimen in the author's collection.

OCCURRENCE: Korean Straits, collected by Petersen, 1893, 1 male, depth 27 meters; 32°12′ N., 128°15′ E., collected by Suenson 1893, 1 male, 1 female, depth 33 meters; 33°10′ N., 129°18′ E., collected by Suenson, 1897, depth 43 meters; Tsugaru Straits, collected by Suenson, 1897, 1 male, 1 female, depth 33 meters; Tsushima Straits, collected by Suenson, 1898, 1 male.

DESCRIPTION: With reference to Mayer's description, 1903.

Male: Body length of adult specimen 5.5 mm (Text-fig. 74, B); pereonite II longer than any other pereonite, I a little longer than half of II, V a little shorter

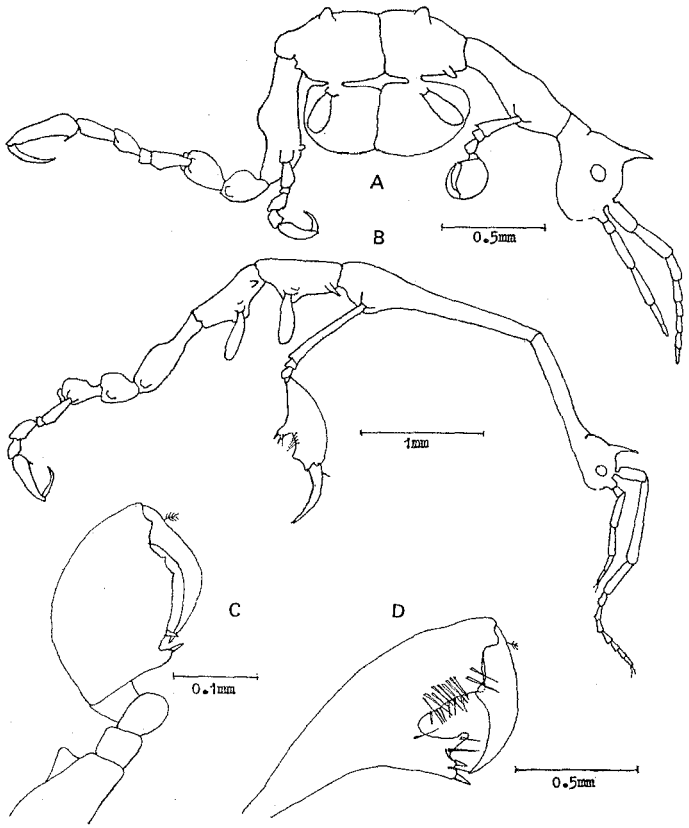

Fig. 74. *Caprella (Spinicephala) chelimana* Mayer (after Mayer).
A, adult female; B, adult male; C, gnathopod 2 of adult female; D, propodus of gnathopod 2 of male.

than I, III a little shorter than V, IV a little shorter than III, VI and VII taken together a little shorter than V; head with an acute dorsal spine frontally, pereonites I and II smooth, pereonites III and IV each with a spiky lateral tubercle in fore part of each side.

Antenna 1, a little shorter than half of body length, its flagellum, 7-segmented; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to rear end of pereonite II, basal segment a little shorter than half of pereonite II, propodus nearly as long as basal segment and more than twice as long as its greatest breadth, proximal angle of palm truncated and projecting, with two teeth and a long poison tooth at its end, a triangular tooth at distal angle of palm, basic part of propodus very narrow, several spines at palmar margin; propodus of pereopod 5 with no palmar spines, but 7 with two palmar spines.

Female: Body length of specimen 4 mm (Text-fig. 74, A); pereonites II and V subequal, pereonites III and IV also subequal in length, and each a little shorter than II, VI and VII taken together a little shorter than III, I a little shorter than half of head; pereonite III and IV each with a pair of dorsal teeth, pereonite III with a spiky lateral tubercle on fore part on each side.

Antenna 1 a little shorter than one-third of body length, its flagellum 5-segmented; gnathopod 2 attached to rather front part of pereonite II, and its basal segment as long as one-third of pereonite II, propodus rounded and as long as basal segment, proximally with a projecting palmar angle bearing a spine, and its fore part with a subpalmar spine, distal projection indistinct.

DISTRIBUTION: Type localities: Korea and Tsugaru Straits.

Other locality around Japan and adjacent waters: Korean Straits (Mayer, 1903: 96–97.); Tsugaru Straits (Mayer, 1903: 96–97).

49. *Caprella* (*Spinicephala*) *californica* Stimpson, 1856

(Jap. name: *Neo-california-warekara* Arimoto, nov.)

Figs. 75, 76, 77.

(?) *Caprella gracilis* Stimpson, 1855, Proc. Acad. nat. Sci. Philadelphia, 7: 384. ——Bate, 1862, Catal. Amphip. Crust. British Mus.: 365. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 70. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 74. ——Utinomi, 1947, Seibutsu (suppl.), 1: 74. Type locality: Japan.

(?) *Caprella solitaris* Stimpson, 1855, Proc. Acad. nat. Sci. Philadelphia, 7: 393–394. ——Bate, 1862, Catal. Amphip. Crust. British Mus.: 365. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 65. ——Stebbing, 1910, Ann. South African Mus., 6 (4): 466. Type locality: Simon's Bay, S. Africa.

Caprella californica Stimpson, 1856, Proc. California Acad. nat. Sci., 1 (2): 89. ——Stimpson, 1857, Boston Journ. nat. Hist., 6 (4): 513–154. ——Boeck, 1871, Forh. Vidensk. Selsk. Christiania, 1871: 35–37, 48, fig. 1. ——Stimpson, 1973, Proc. California Acad. nat. Sci., 1 (ed. 2): 97. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 68–69. ——Holmes, 1908, Proc. United States Nat. Mus., 35 (1654): 543. ——Dougherty and Steinberg, 1953, Proc. biol. Soc. Washington, 66: 44, 47. ——Dougherty and Steinberg, 1954, in Light et al., Intertidal Invert. Centr. Calif. Coast: 170, 171, fig. 82b. ——Gardella, 1962, Biol., 45 (1–2): 1, 3. ——R.G. Johnson, 1965, Progr. Rep. Atomic Energy Comm. app. 1: 3, app. 2: 2. ——Johnson and Juskevice, 1965, Res. Rep. Pacific Mar. Sta., 5: 39. ——R.G.

Johnson, 1966, Progr. Rep. Atomic Energy Comm., app. 1: 3, app. 2: 2, app. 3: 2. ——Saunders, 1966, Crustaceana, 10 (3): 314–316. ——Ricketts, Calvin and Hedgpeth, 1968, Between Pacific Tides, (ed. 4): 299, 491. ——Keith, 1969, Crustaceana, 16 (2): 119–124. ——Laubitz, 1970, Nat. Mus. of Nat. Sci. Pub. bio. Oce., 1: 49, fig. 15.

Caprella scaura (not Templeton, 1836), Mayer, 1890, Fauna Flora Golf. Neapel, 17: 72 (in part). ——(?) D' A.W. Thompson, 1901, Catal. Crust. Mus. Dundee: 42. ——Johnson and Snook, 1972, Seashore Anim. Pacific Coast: 281–282, fig. 236. ——Wailes, 1931, Notes Vancouver Mus. Art, 1 (1): 41. ——Clemens, 1933, Check list Fauna Flora Canadian Pacific Coast: 49. ——MacGinitie, 1935, Amer. Midl. Nat., 16 (5): 701. ——Ricketts and Calvin, 1939, Between Pacific Tides: 194–195. ——Shoemaker, 1942, Smithsonian Misc. Coll., 101 (11): 49. ——Hewatt, 1946, Ecol. Monogr., 16 (3): 201, 202, 204. ——Ricketts and Calvin, 1952, Between Pacific Tides, (ed. 3): 248–249.

Caprella scaura f. *spinirostris* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 72, pl. 4 figs. 46–47. —— Mayer, 1903, Siboga Exped. Mon., 34: 119, Type locality: Coquimbo, Chile.

Caprella scaura f. *californica* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 72. ——Mayer, 1903, Siboga Exped. Mon., 34: 119.

Caprella scaura f. *scauroides* Mayer, 1903, Siboga Exped. Mon., 34: 119. ——Utinomi, 1947, Seibutsu (suppl.), 1: 77. Type locality: Hongkong.

Caprella scaura scauroides Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 45.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Aug. 18, 1928, attached to *Sargassum*, 1 male, Coll. no. 63, Aug. 21, 1928, attached to *Agraophenia*, 1 male, 1 female, Coll. no. 34, attached to *Sargassum*, 1 male, Coll. no. 42, 1 male, Coll. no. 70; Awajishima collected by Arimoto, Apr. 11, 1934, 1 male, Coll. no. 86; Shodoshima, collected by Tomoyoshi Fujita, Mar. 7, 1967, attached to pearl oyster, 4 males, Coll. no. 139; Off Fukaura-cho, Aomori Pref., collected by Yoshihiko Hasegawa, May 21, 1968, attached to set-net, many males and females, Coll. no. 237; Off Yokohama-cho, Aomori Pref., collected by Harutake Ishioka, May 7, 1968, attached to *Undaria pinnatifida*, many males and females, Coll. no. 22; Ajigasawa, Aomori Pref., collected by Kunio Takahashi, Mar. 25, 1968, depth 15 meters, 1 male, Coll. no. 166, 4 males, 1 female, Coll. no. 169; Ohshima, Sagami Bay, collected by Yōzō Kurata, Aug. 1, 1968, depth 80 meters, many males and females, Coll. no. 329; Naoezu, collected by Okimoto Morita, May 25, 1968, many males and females, Coll. no. 256; Ryozu, collected by Toshihiko Tone, Mar. 21, 1968, attached to set-net, 1 male, Coll. no. 125; Itoigawa, collected by Shizuo Shoyama, Apr. 16, 1968, attached to *Undaria pinnatifida*, depth 4 meters, many males and females, Coll. no. 203; Off Ohmi-cho, Niigata Pref., collected by Takeji Yamagishi, May 24, 1968, attached to *Undaria pinnatifida*, many males and females, Coll. no. 240, Off Toda, May 29, 1968, attached to *Undaria pinnatifida*, 1 male, 2 females, Coll. no. 242; Off Himi, Toyama Pref., collected by Toyama Fish. Exp. St., Dec. 17, 1968, 1 male, 2 females, Coll. no. 339; Off Noto, Ishikawa Pref., collected by Shigeru Tanaka, March 14, 1968, 2 males, 1 female, Coll. no. 122; Off Arai, Shizuoka Pref., collected by Tsunetaro Kitajima, Jun. 20, 1968, attached to set net, 1 male, Coll. no. 39; Ushimado, Okayama Pref., collected by Okayama Fish. Exp. St., Apr. 26, 1968, attached to *Sargassum*, 7 males, 6 females, Coll. no. 212; Off Takata, Nobi-cho, Hiroshima Pref., collected by Hisaji Kubota, May 4, 1968, 10 males, 14 females, Coll. no. 216; Off Onomichi, collected by Hiroshima Fish. Exp. St., May 6, 1968, attached to *Undaria pinnatifida*, 3 males, 3 females, Coll. no. 230; Numakuma, Hiro-

shima Pref., collected by Hamai and Yokoyama, May 15, 1968, 20 males, 12 females, Coll. no. 246; Otodo, Tomokura, collected by Hiroshima Fish. Exp. St., Feb. 26, 1968, 8 males, 2 females, Coll. no. 134; Nakajima, Ehime Pref., collected by Tadashi Koba, Feb. 14, 1968, taken from pearl oyster farming net, 2 males, 1 female, Coll. no. 151; Uwajima Bay, collected by Ehime Fish. Exp. St., Mar. 18, 1968, many males and females, Coll. no. 154; Kushima Island, collected by Ehime Fish. Exp. St., Mar. 18, 1968, 2 males, 1 female, Coll. no. 155; Uwajima Bay, collected by Ryuzo Sano, Mar. 18, 1968, attahced to pearl oyster farming net, many males and females, Coll. no. 159; Izari, Tokushima Pref., collected by Yasuhiko Jho, May 6, 1968, attached to *Undaria pinnatifida*, many males and females, Coll. no. 223; Ito-shima, Genkai-nada, collected by Fukuoka Fish. Exp. St., Apr. 15, 1968, attached to *Undaria pinnatifida*, 1 male, Coll. no. 286; Toishima, Kumamoto Pref., collected by Tadashi Koba, Feb. 14, 1968, attached to pearl oyster farming net, many males and females, Coll. no. 147; Senzokuzozoshima, Amakusa, collected by Tadashi Koba, Feb. 14, 1968, attached to pearl oyster farming net, 10 males, 2 females, Coll. no. 152; Off Nichinan-shi, collected by Miyazaki Fish. Exp. St., Mar. 10, 1968, 7 male, 1 female, Coll. no. 207; Aburatsu, Nichinan-shi, collected by Hirotaka Toshimi, Mar. 10, 1968, 7 males, 2 females, Coll. no. 207; Tassha Bay, Sado Island, collected by Kitami, Jul. 12, 1969, 3 males, 2 females, Coll. no. 385; Notobara, Numakuma, Hiroshima Pref., collected by Akira Hamai, Mar. 7, 1969, attached to *Undaria pinnatifida*, 25 males, Coll. no. 340; The Yellow Sea, collected by Keisuke Okada, Nov. 11, 1969, attached to drifting *Bugura* (Bryozoa), many males and females total 1758, Coll. nos. 338, 364, 366, 368; Tassha Bay, Sado Island collected by Kitami and Arimoto, May 2, 1970, 1 male, Coll. no. 408; Sekumi Bay, Fukui Pref., collected by Satoshi Ohnuki, Jan. 12, 1970, attached to *Undaria pinnatifida*, 8 males, 3 females, Coll. no. 374; Shiosaki, Kushimoto, on *Acanthaster planci*, 1 male, Mar. 15, 1973, collected by Kenichi Hayashi, Coll. nos. 650–653; Iki Island, 9.5 meters depth, 3 males, collected by J.I. Bruce, 1971, Coll. nos. 652–653; Shiraki, Fukui Pref., in the stomach of *Trachurus japonicus*, 1 male, Aug. 5, 1973, collected by Tohru Yasuda, Coll. nos. 660–661.

DESCRIPTION: Male: Body length of adult specimen 30 mm (Text-fig. 75, A), especially elongate; pereonite I the longest of all segments, II a little shorter than I, V shorter than II, III a little shorter than V, IV a little shorter than III, VI and VII taken together a little shorter than IV; head armed with a strong forward curved horn dorsally, pereonite I smooth, pereonite II somewhat thickened toward rear part, and with a small ventral spine between insertions of 2nd gnathopods, pereonite III and IV each with antero-lateral spine and rearward-lateral spine, pereonite V with a dorsal process at rear part, pereonites VI and VII each with a pair of dorsal processes.

Antenna 1, longer than head plus pereonites I and II, flagellum a little shorter than segment 2 of peduncle, and 20-segmented; antenna 2 a little longer than segments 1 of peduncle of antenna 1, flagellum with swimming setae.

Mouth, typical of the genus.

Gnathopod 2, attached to rear part of pereonite II, its basal segment a little shorter than pereonite II, propodus longer than basal segment, and rather longer than four-times of its width, narrow proximally and widening distally, medial of palmar with associated accessory spine, distally with a triangular tooth, poison tooth situated near by triangular projection with narrow notch, feathery spines on all its surface.

Gills elongate.

Pereopod 5 a little shorter than pereonite V, its propodus with palmar spines placed a little lower down, and dorsal margin with set of spinules.

A specimen of young male of 10.7 mm (Text-fig. 75, B): Pereonite II the longest of all segments, III a little shorter than II, V a little shorter than III, IV a little

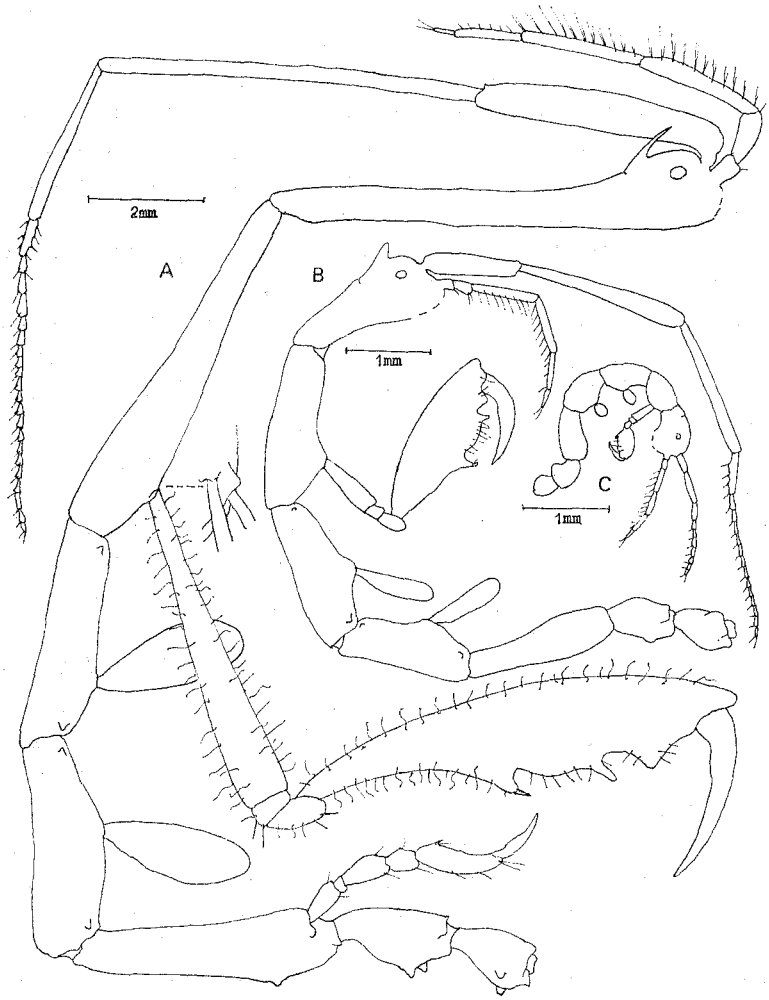

Fig. 75. *Caprella* (*Spinicephala*) *californica* Stimpson.
A, adult male (material from Numakuma, Hiroshima Pref., Coll. no. 340); B, young male (material from the Yellow Sea, Coll. no. 338); C, larva of male (material from the Yellow Sea, Coll. no. 338).

shorter than V, VI and VII taken together a little shorter than V, I a little shorter than IV plus VII together, pereonites III and IV each with a lateral spine on rear lateral side.

Antenna 1 a little shorter than head plus pereonites I-IV; its flagellum, 14-segmented. Gnathopod 2 attached to rear part of pereonite II, its basal segment a little shorter than half of pereonite II, propodus a little longer than pereonite II, more than twice as long as its greatest breadth, which is projecting and bearing a spine, palm fringed with small spines.

A specimen of larva (Text-fig. 75, C): Body length 3.5 mm, smooth; pereonite V longest of all segments, pereonites II, III and IV subequal in length, pereonite I shorter than any other segments; flagellum of antenna 1, 7-segmented; antenna 2 a little shorter than antenna 1; gills oval.

Female: Body length of adult specimen 17 mm (Text-fig. 76, D); pereonite V, longest of all segments, II a little shorter than V, III a little shorter than II, IV

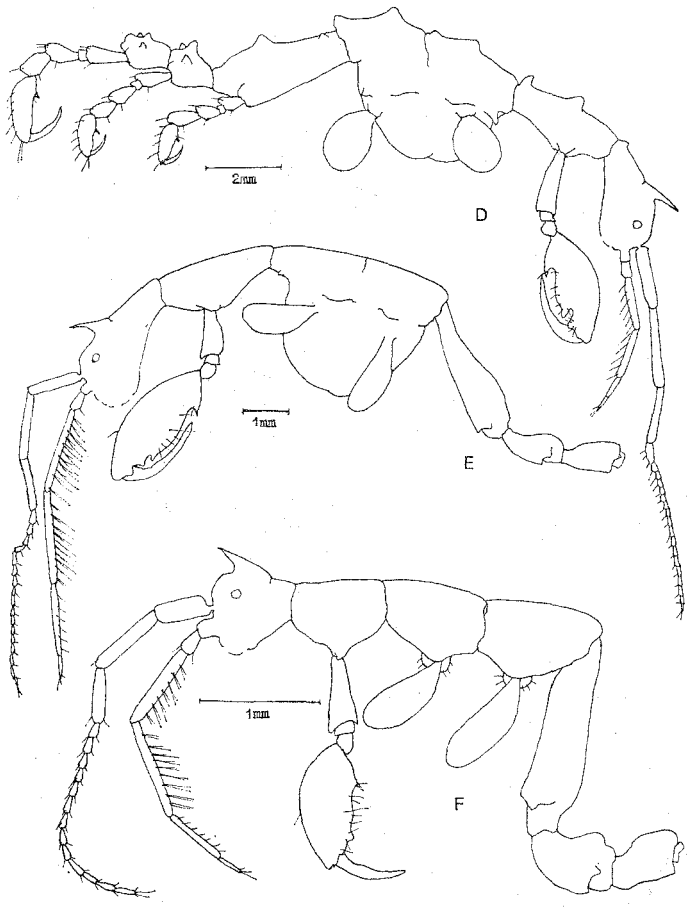

Fig. 76. *Caprella (Spinicephala) californica* Stimpson.
D, adult female (material from Uwajima Bay, Ehime Pref., Coll. no. 154); E, adult female (material from the Yellow Sea, Coll. no. 364); F, young female (material from the Yellow Sea, Coll. no. 364).

a little shorter than III, VI and VII taken together a little shorter than IV, I about as long as head; head with an acute dorsal tooth, pereonite I carries a dorsal tooth at distal end, pereonite II with two dorsal tubercles, larger one at behind centre, and smaller one at distal end, pereonites III and IV each with a couple of dorsal teeth at about centre and at distal end, pereonite V with a dorsal tooth at about centre, pereonite VI and VII each with one dorsal tooth and a pair of dorsal processes.

Flagellum of antenna 1, 20-segmented; antenna 2 a little shorter than peduncle of antenna 1. Gnathopod 2 attached to near front of pereonite II, segment 1 shorter than pereonite II, propodus large, rather twice as long as its breadth, palm with a proximal grasping spine, an accessory spine and a minute distal poison spine, and triangular tooth; gills oval.

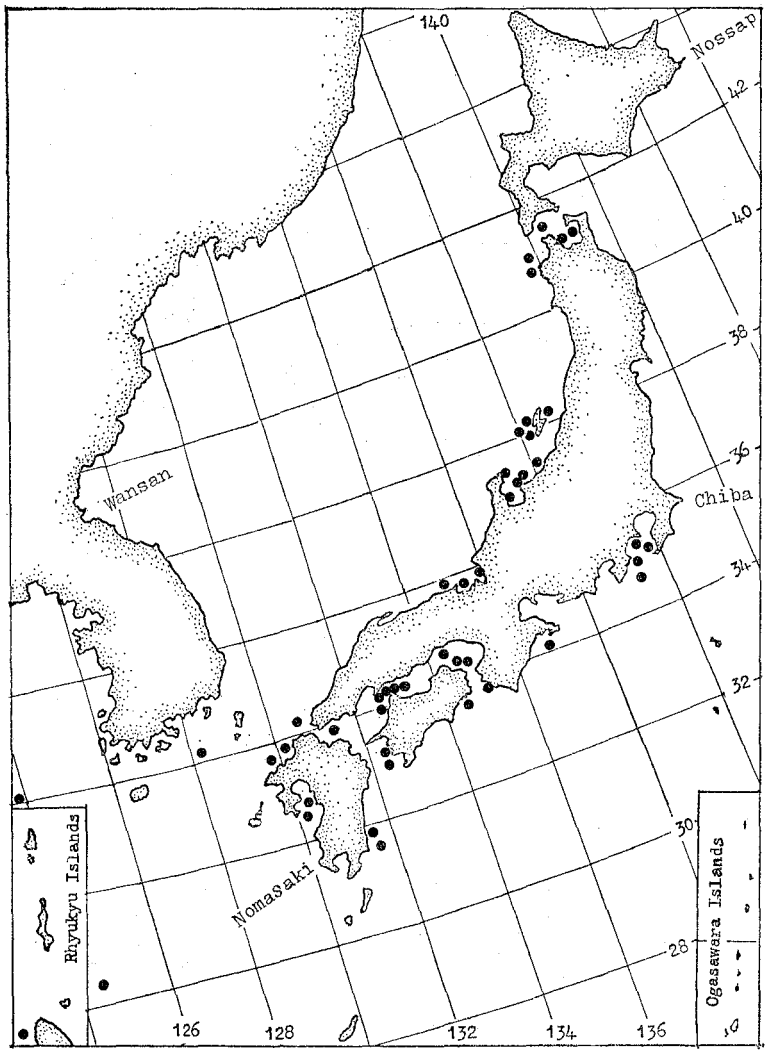

Fig. 77. Distribution records of *Caprella* (*Spinicephala*) *californica* Stimpson, 1856, around Japan.

A specimen of body length 13 mm (Text-fig. 76, E): Pereonites smooth; V the longest, I much shorter than II, which is not so long but longer than III; flagellum of antenna 1, 17-segmented; antenna 2 subequal as long as anetnna 1; gills elongate.

A specimen of body length 6 mm (Text-fig. 76, F): Smooth; pereonite V the longest, and I the shortest; flagellum of antenna 1, 13-segmented; antenna 2 a little shorter than antenna 1; gnathopod 2 attached to middle of pereonite II; pereonites III and IV each with small oostegite but marsupium not yet formed; gills elongate.

DISTRIBUTION: Type locality: California.

Other records: Canadian Pacific Coast; Friday Harbor, Washington; Mendocino, Humboldt Bay, Tomales Bay, Pt. Reyes, San Francisco, Monterey Bay, Elkhorn Slough, Sausalito Bay, Santa Catalina, Santa Barbara, Santa Cruz, and San Diego, California; Magdalena Bay and Cape San Lucas, Mexico; Chile; Formosa Strait, 50.96 meters; Hongkong; (?) South Africa.

Other localities around Japan and adjacent waters: Tsuruga Bay (Mayer, 1893); Tsugaru Straits, 54.6 meters (Mayer, 1903: 118); Ohmori (Mayer, 1903: 118); Korean Straits (Mayer, 1903: 118); Formosa (Mayer, 1903: 118); Gokasho Bay (Utinomi, 1947: 77); Maizuru (Utinomi, 1947: 77); Tanabe Bay (Utinomi, 1947: 77); Okinoshima, Fukuoka (Utinomi, 1947: 77); Off Fukaura, Aomori Pref. (Arimoto, 1971: 45); Off Yokohama-cho (Arimoto, 1971: 45); Ajigasawa (Arimoto, 1971: 45); Tateyama Bay (Arimoto, 1971: 45); Itoigawa (Arimoto, 1971: 45); Tada, Sado Island (Arimoto, 1971: 45); Naoezu (Arimoto, 1971: 45); Ryozu Bay (Arimoto, 1971: 45); Toyama Bay (Arimoto, 1971: 45); Uozu (Arimoto, 1971: 45); Ushizu, Noto (Arimoto, 1971: 45); Off Arai (Arimoto, 1971: 45); Awajishima (Arimoto, 1971: 45); Off Nomi-cho (Arimoto, 1971: 45); Onomichi (Arimoto, 1971: 45); Numakuma-cho (Arimoto, 1971: 45); Off Ondo-cho (Arimoto, 1971: 45); Shōdoshima (Arimoto, 1971: 45); Nakajima, Ehime Pref. (Arimoto, 1971: 45); Uwajima Bay (Arimoto, 1971: 45); Izari, Tokushima Pref. (Arimoto, 1971: 45); Itoshima Sea (Arimoto, 1971: 45); Toijima, Kumamoto Pref. (Arimoto, 1971: 45); Amakusa, Zenzokuzozoshima (Arimoto, 1971: 45); Off Aburatsu (Arimoto, 1971: 45).

Later collection: Tateyama Bay (Arimoto, 1928, Coll. nos. 34, 42, 49, 63, 70); Toyama Bay (Tadashi Hamaya, 1968, Coll. no. 235); Uwajima Bay (Ehime Fish. Exp. St., 1968, Coll. nos. 155, 159); Itoigawa (Arimoto, 1971: 45).

New collections around Japan: Oumi-cho, Niigata Pref. (Takeji Yamagishi, 1968, Coll. no. 240); Tassha Bay, Sado Island (Takehiko Kitami, 1968, Coll. no. 240, Coll. no. 393); Tassha Bay, Sado Island, depth 1 meter (Kitami, Ishimi and Arimoto, 1970, Coll. nos. 408, 430); Tassha Bay, Sado Island (Kitami, Ishimi and Arimoto, 1970, depth 5 meters, Coll. nos. 435, 440, 442, 443, 450, 455, 560, 465, 466; depth 10 meters, Coll. nos. 446, 494; depth 17 meters, Coll. nos. 396, 471, 476, 479); Senkaku Ikkei, Sado Island (Kitami, Ishimi and Arimoto, 1970, Coll. no. 604); Senkaku Sankei, Sado Island (Kitami, Ishimi and Arimoto, 1970, Coll. no. 485); Himetz Bay, Sado Island (Kitami, Ishimi and Arimoto, 1970, Coll. no. 627); Off Futami, Sado Island (Ishimi and Arimoto, 1970, Coll. no. 637); Momojima,

Onomichi (Takeshi Sakinaga, 1970, Coll. no. 644); Yashirojima, Yamaguchi (sent me by Takahiro Fujino, Coll. by Ken Tateishi, Coll. no. 647); the Yellow Sea (Keisuke Okada, 1968, Coll. nos. 338, 363, 364, 366); Kushimoto, Wakayama Pref. (K. Hayashi, 1973, Coll. no. 650(3)); Iki Island (J.I. Bruce, 1971, Coll. no. 652(3)); Shiraki, Fukui Pref. (T. Yasuda, 1973, Coll. no. 660(1)).

50. *Caprella (Spinicephala) scaura* Templeton, 1836

Caprella scaura Templeton, 1836, Trans. Entom. Soc. London, 1: 191–192, pl. 20 fig. 6. ——H. Milne Edwards, 1840, Hist. nat. Crust., 3: 107. ——(?) Herklots, 1861, Tijdschr. Entomol., 4: 43. ——Bate, 1862, Catal. Amphip. Crust. British Mus.: 355, pl. 56 fig. 4. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 65. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 70–73, pl. 4 figs. 40–51, pl. 6 fig. 41, pl. 7 figs. 2, 35–36 (in part). ——Mayer, 1903, Siboga Exped. Mon., 34: 117–120, pl. 5 figs. 13–18, pl. 10 figs. 11 (in part). ——(?) Stebbing, 1910, Mem. Australian Mus., 4 (12): 653–654. ——Walker, 1916, Ann. Mag. nat. Hist., (8) 17: 346. ——Barnard, 1925, Ann. South African Mus., 20 (5): 371–372. ——Hale, 1927, Trans. Roy. Soc. South Australia, 51: 315. ——Hale, 1929, Crust. South Australia: 234, fig. 229. ——Arimoto, 1931, Journ. Tokyo Nat. Hist. Soc., 29 (41): 16–18, pl. 3 figs. 1–6. ——Hiro (=Utinomi), 1937, Annot. Zool. Japon., 16 (4): 314–315, fig. 3, pl. 22 figs. 11–12. ——Day and Morgan, 1956, Ann. Natal Mus., 13 (3): 303. ——Stschapova, Mokyevsky and Pasternak, 1957, Trudy Akad. Nauk USSR, 23: 87. ——Irie, 1958, Bull. Fac. Fish. Nagasaki Univ., 7: 89–91. ——Irie, 1959, Bull. Fac. Fish. Nagasaki Univ., 8: tab. 4. ——Hirosaki, 1964, Misc. Rep. Res. Inst. Nat. Resources, 62: 68. ——McCain, 1968, Bull. United States Nat. Mus., 278: 40–44, figs. 17–18, 55. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 37.

Caprella attenuata Dana, 1853, United States Explor. Exped., 14 (2): 817–819. ——Dana, 1855, United States Explor. Exped., 13/14 (atlas): pl. 55 fig. 1. ——Bate, 1862, Catal. Amphip Crust. British Mus.: 364, pl. 57 fig. 7. ——F. Müller, 1869, Facts and Arguments for Darwin: 41. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 67–68, figs. 24–25. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 73. ——Miers, 1884, Rep. zool. collect. Alert: 320–321, pl. 34 fig. c. ——Haswell, 1885, Proc. Linn. Soc. New South Wales, 9: 1000. ——De Oliveira, 1940, Mem. Inst. Oswaldo Cruz, 35 (1): 139. ——(?) Sanchez, 1957, Bull. Soc. zool. France, 82: 24–28, figs. 1–2. Type locality: "Near the fort, not far from Praya Grande, Rio de Janeiro", Brazil.

Caprella attenuata f. *subtenuis* Dana, 1853, United States Explor. Exped., 14 (2): 818–819. ——Dana, 1855, United States Explor. Exped., 13/14 (atlas): pl. 55 fig. 1c. Type locality: "Near the fort, not far from Praya Grande, Rio de Janiero", Brazil.

Caprella cornuta Dana, 1853, United States Explor. Exped., 14 (2): 816–817. ——Dana, 1855, United States Explor. Exped., 13/14 (atlas): pl. 54 fig. 5. ——Bate, 1862, Catal. Amphip. Crust. British Mus.: 356, pl. 56 fig. 5. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 68. ——Chilton, 1921, in Skottsberg, Nat. Hist. Juan Fernandez and Easter Island, 3 (14): 90–91, fig. 4. ——De Oliveira, 1940, Mem. Inst. Oswald Cruz, 35 (1): 139. Type locality: "Near the fort, not far from Praya Grande, Rio de Janeiro", Brazil.

Caprella cornuta f. *obtusirostris* Dana, 1853, United States Explor. Exped., 14 (2): 817. ——Dana, 1855, United States Explor. Exped., 13/14 (atlas): pl. 54 fig. 6. Type locality: "Near the fort, not far from Praya Grande, Rio de Janeiro", Brazil.

Caprella nodosa Templeton, 1836, Trans. Entom. Soc. London, 1: 192–194, pl. 21 fig. 7. ——H. Milne Edwards, 1840, Hist. nat. Crust., 3: 108. ——Bate, 1862, Catal. Amphip. Crust. British Mus.: 357, pl. 56 fig. 7. Type locality: "At Mauritius or on the way thither...".

Caprella scaura f. *cornuta* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 71–72, pl. 4 figs. 50–51. ——Mayer, 1903, Siboga Exped. Mon., 34: 118.

Caprella scaura f. *diceros* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 71. ——Mayer, 1903, Siboga Exped. Mon., 34: 118. ——Miyadi and Masui, 1942, Occ. Pap. Japanese Oceanogr., 2 (1): 10. ——Utinomi, 1943, Sci. Rep. Tohoku imp. Univ., (Biol. 4) 17 (3): 279. ——Utinomi, 1943, Sci. Rep.

Tohoku imp. Univ., (Biol. 4) 17 (3): 285, fig. 5. ——Utinomi, 1947, Seibutsu (suppl.), 1: 77. —— Sando, 1964, Bull. mar. biol. Sta. Asamushi, 12 (1): 31. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14, pl. 1 fig. 5, pl. 3 figs. 13–14. Type locality: Off Kobe.

Caprella scaura diceros Stebbing, 1888, (*Caprella scaura*) not Templeton, 1836, Rep. Voy. Challenger, (zool.) 29 (67): 1257–1264, pl. 144. ——Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 211–214, figs. 11–12. ——Kikuchi, 1966, Publ. Amakusa biol. Lab., 1 (1): tab. 21. ——Utinomi, 1969, Publ. Seto mar. biol. Lab., 16 (5): 304. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 44. ——Arimoto, 1971, Ann. Rep. Sado mar. biol. Sta. Niigata Univ., 1: 42–48, figs. 10–14. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 35.

Caprella scaura f. *hamata* Utinomi, 1947, Seibutsu (suppl.), 1: 77, fig. 7. ——Sando, 1964, Bull. mar. biol. Sta. Asamushi, 12 (1): 31. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 15, pl. 1 fig. 3, pl. 3 figs. 12. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 35. Type localities: Several localities in Japan.

Caprella scaura hamata, Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 44.

Caprella scaura f. *typical* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 71, pl. 4 figs. 48–49. —— Mayer, 1903, Siboga Exped. Mon., 34: 118. ——Miyadi and Masui, 1942, Occ. Pap. Japanese Oceanogr., 2 (1): 10. ——Utinomi, 1947, Seibutsu (suppl.), 1: 77. Type locality: Rio de Janeiro, Brazil.

Caprella scaura typica Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 45.

Caprella scaura f. *undetermined* Mayer, 1903, Siboga Exped. Mon., 34: 120.

50–(1) *Caprella* (*Spinicephala*) *scaura typica* Mayer, 1890

(Jap. name: *Kobutogenashi-warekara* Arimoto, 1971)

Fig. 78.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Aug. 21, 1928, attached to *Bugulla*, 1 male, Coll. no. 45, collected by Kunizo Tanaka, Apr. 8, 1968, 8 males, 3 females, Coll. no. 200; Shiosaki, Kushimoto, Wakayama Pref., collected by Kenichi Hayashi, Mar. 15, 1973, to *Acanthaster planci*, 2 males, Coll. no. 650(6).

DESCRIPTION: Male: Body length of specimen 19 mm (Text-fig. 78, A), smooth except head and pereonite V; pereonite II, longest of all segments, I a little shorter than II, V a little shorter than I, III a little shorter than V, IV not as long as III, VI and VII taken together a little shorter than V; head bearing one acute frontal spine, pereonite V with two pairs of dorsal processes; antenna 1 a little shorter than half of body length, basal part of flagellum with 7 segments not separate, distal part with 5 segments; antenna 2 a little shorter than half of peduncle of antenna 1; basal segment of gnathopod 2 a little shorter than pereonite II, propodus a little shorter than basal segment; gills elongate.

Female: Body length of specimen 10 mm (Text-fig. 78, B); pereonite I a little shorter than VI, pereonite II with a pair of dorsal teeth at middle, pereonites III and IV each with a pair of large dorsal teeth, pereonites VI and VII with a pair of dorsal processes; gnathopod 2 attached to front part of pereonite II, propodus of pereopods with a pair of grasping spines proximally.

DISTRIBUTION: Type locality: Rio-de-Janeiro, Brazil.

Other localities around Japan: Tateyama Bay (Arimoto, 1928, Coll. no. 45); Off Ohmori, Tokyo (Mayer, 1903, 117); Nanao Bay (Utinomi, 1947: 77); Kushimoto Wakayama Pref. (Hayashi, 1973, Coll. nos. 650(1) to 650(5)).

Additional collection: Tateyama Bay (Kunizo Tanaka, 1968, Coll. no. 200).

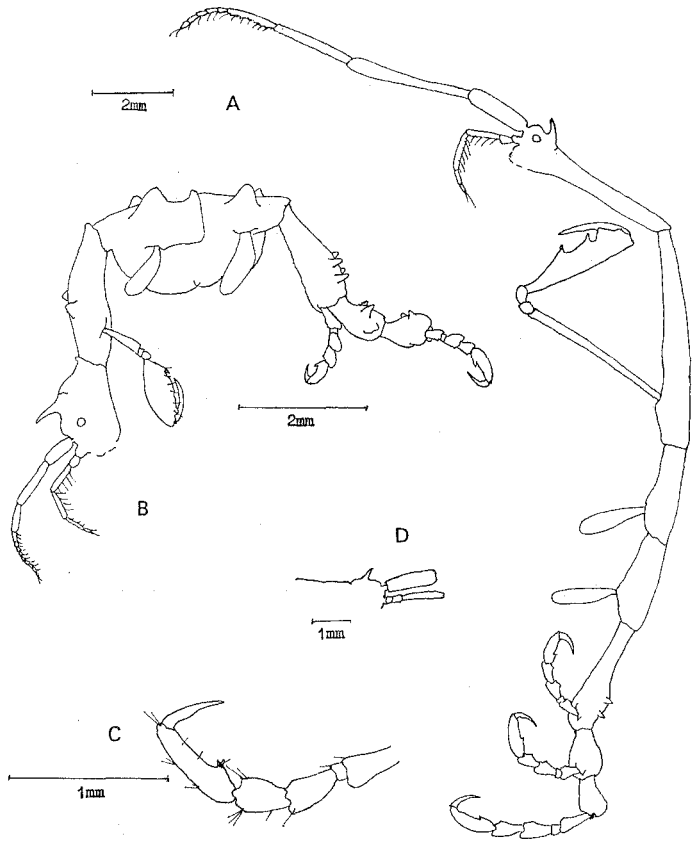

Fig. 78. *Caprella (Spinicephala) scaura typica* Mayer (after Mayer).
A, adult male; B, adult female; C, pereopod 6 of male; D, head.

50–(2) *Caprella (Spinicephala) scaura diceros* Mayer, 1890

(Jap. name: *Toge-warekara* Iwasa)

Figs. 79, 80, 81.

OCCURRENCE: Tateyama Bay, collected by Arimoto, May 7, 1927, attached to *Zostera*, 8 males, 1 female, Coll. no. 1, attached to *Sargassum*, 1 male, 7 females, Coll. no. 5, Mar. 24, 1927, collected by Yaichiro Okada; Tomioka Kanagawa Pref., collected by Arimoto, Apr. 28, 1929, 8 males, 9 females, Coll. no. 78; Tateyama Bay, collected by Arimoto, Apr. 4, 1928, 1 male, 2 female, Coll. no. 17; Najima, Fukuoka, collected by Hiroshi Ohshima, Apr. 30, 1930, 4 males, 3 females, Coll. no. 107; Kanazawa, Kanagawa Pref., collected by Kanagawa Fish Exp. St., Jun. 1, 1935, 1 male, Coll. no. 112, Jul. 1, 1935, many, Coll. no. 113, Sep. 2, 1935, many males and females, Coll. nos. 109–111, Aug. 9, 1935, 1 male, Coll. no. 114; Kamo-ko, Sado Island, collected by Takehiko Kitami, May 11, 1966, 4 males, Coll. no. 375; Komi-

nato, collected by Arimoto, Aug. 25, 1967, 8 males, 3 females, Coll. no. 140; Kamo-ko, Sado Island, collected by Takehiko Kitami, May 9, 1967, 78 males, 112 females, Coll. no. 377, Jun. 12, 1967, 20 males, 8 females, Coll. no. 378, Mar. 13, 1967, 28 males, 8 females, Coll. no. 376, Jul. 4, 1967, 7 males, 7 females, Coll. no. 379; Shodo-shima, collected by Tomoyuki Fujimoto, Mar. 7, 1967, 8 males, 3 females, Coll. no. 67; Off Shiogama of Nono-shima, collected by Hideo Ohara, May 11, 1968, taken from oyster farm rope, 5 males, 8 females, Coll. no. 238; Off Oga-shi, Akita Pref., collected by Kentaro Akama, Jun. 26, 1968, 5 males, 7 females, Coll. no. 297; Off Shiba-cho, Kanagawa Pref., collected by Naoyuki Natsuyagi, May 14, 1968, depth 5 meters, Coll. no. 116; Kotomari Bay, Wakasa, collected by Tohru Yasuda, Apr. 30, 1968, Coll. no. 270; Toyoura, Aichi Pref., collected by Aichi Fish. Exp. St., Apr. 3, 1968, 1 male, Coll. no. 178, 1 female, Coll. no. 179; Kashikojima, Mie Pref., collected by Yutaka Yamamura, Jun. 4, 1968, 2 males, 1 female, Coll. no. 283; Owase Bay, Mie Pref., collected by Owase Fish. Exp. St., Apr. 3, 1968, 3 males, 3 females, Coll. no. 197; Saigo Bay, Oki Island, Shimane Pref., collected by Nobuo Matsunaga, Apr. 6, 1968, 3 males, 7 females, Coll. no. 201; Ushimado Bay, collected by Okayama Fish. Exp. St., Apr. 26, 1968, 1 male, Coll. no. 211; Inumi, Fukui Pref., collected by Tadashi Koba, Feb. 14, 1968, 6 males, 1 female, Coll. no. 143; Uwajima Bay, Ehime Pref., collected by Tadashi Koba, Feb. 14, 1968, 8 males, 5 females, Coll. no. 142, collected by Ryozo Sano, Mar. 18, 1968, very many males and females, Coll. nos. 156, 159, collected by Toshiomi Hamada, Mar. 18, 1968, 18 males, 16 females, Coll. no. 119, collected by Ehime Fish. Exp. St., Feb. 27, 1968, 2 males, 5 females, Coll. no. 161; Izari Tokushima Pref., collected by Yasuhiko Jo, May 6, 1968, 7 males, 1 female, Coll. no. 224; Shinjuhama, Saga Pref., collected by Atsushi Ichihara, Saga Fish. Exp. St., May 28, 1968, many males and females, Coll. no. 259; Shimahara Peninsula, collected by Toshiro Zeisho, May 24, 1968, many males and females Coll. no. 263; Amakusa, Kumamoto, collected by Tadashi Koba, Feb. 14, 1968, 4 males, Coll. no. 148; Shimabara, Kumamoto Pref., collected by Fusao Ohta, Apr. 17, 1968, 8 males, 7 females, Coll. no. 217; Shiranuhi Sea, collected by Kumamoto Fish. Exp. St., Feb. 16, 1968, 8 males, 2 females, Coll. no. 135; Amura, Amakusa, collected by Tadashi Koba, Feb. 15, 1968, 2 males, 1 female, Coll. no. 148; Shimonoe, Usuki, Ohita Pref., collected by Yoshiaki Torijima, Mar. 15, 1968, 5 males, 1 female, Coll. no. 184; Nagoya-saki, Kamae Bay, collected by Yoshimasa Yoshioka, May 2, 1968, many males and females, Coll. no. 231; Usuki Bay, collected by Ohita Fish. Exp. St., Mar. 15, 1968, 7 males, 1 female, Coll. no. 184; Off Kamae-cho, collected by Kamae Fish. Comp., May 9, 1968, 10 males, 1 female, Coll. no. 290; Off Yonohzu, Ohita, collected by Yonohzu Fish. Comp., May 14, 1968, many males and females, Coll. no. 293; Ohshima Straits, collected by Hayao Shionami, Feb. 24, 1968, 28 males, 8 females, Coll. no. 133; Off Matsushima-cho, Miyagi Pref., collected by Hitoharu Yazawa, Nov. 12, 1969, 13 males, 13 females, Coll. no. 362; Kamo-ko, Sado Island, collected by Takehiko Kitami, Jul. 8, 1969, 3 males, 2 females, Coll. no. 380, collected by Kitami, Iwami, Yamamoto and Arimoto, on oyster nets, May 4, 1970, 62 males, 57 females, Coll. no. 381, collected by Tone,

Iwami, Yamamoto and Arimoto, May 4, 1970, 241 males, 287 females, Coll. no. 382; Tassha Bay, Sado Island, collected by Kitami and Arimoto, May 2, 1970, many males and females, Coll. no. 395, attached to rope depth 18 meters; attached to *Sargassum*, 2 males, Coll. no. 407; Iki Island, 1 male and 1 female, J.I. Bruse, coll. 1971, Coll. no. 652(6); Off Hiroshima-shi, on *Undaria*, 9 males and 5 females, Mar. 27, 1943, Yoshimitsu Arakawa coll., Coll. no. 653(2).

DESCRIPTION: Male: Body length of adult specimen 22.5 mm (Text-fig. 79, A), very different from the proceeding in form since it is especially elongated; pereonite II longest of all segments, V a little shorter than II, I a little shorter than V,

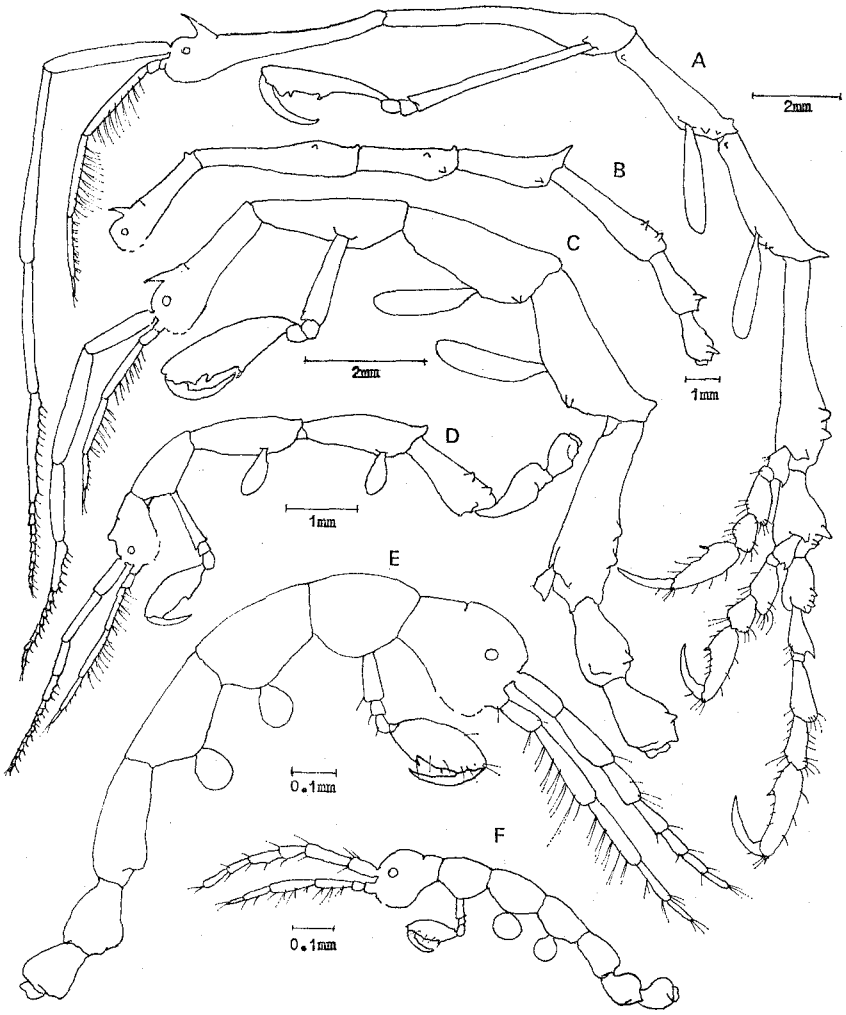

Fig. 79. *Caprella* (*Spinicephala*) *scaura diceros* Mayer.
A, adult male (Arimoto, 1931); B, adult male (material from Tateyama Bay, Coll. no. 2); C, young male (material from Tateyama Bay, Coll. no.17); D, young male (material from Kamo-ko, Coll. no. 382); E, larva male (material from Kamo-ko, Coll. no. 382); F, larva male (material from Kamo-ko, Coll. no. 376).

III and IV subequal, and a little shorter than I, VI and VII taken together a little shorter than I; head armed above with a strong forward curved spine, pereonite II smooth, pereonite III terminating in a prominently raised knob, and with a lateral tubercle at fore part and distal end, pereonite IV with a strong process curved backward at posterior end, and a lateral tubercle at fore part and distal end, pereonite V with two pairs of tubercles at rear part of back, pereonite VI and VII each with two pairs of dorsal tubercles.

Antenna 1 a little longer than half of body length, its flagellum a little shorter than half of its peduncle, and basal 12 segments not clearly separated, while distal part clearly 10-segmented; antenna 2 a little shorter than peduncle of antenna 1.

Cutting end of incisor of mandible divided into 5 strong teeth, lacinia mobilis similar to that in the forma *typica*, and divided into 4 teeth, spine-row consisting of 3 spines to the left, of 2 spines to the right, molar tubercle powerful, and apparently not strongly denticulate, presenting an angular prominence on the side near spine-row; maxilla 1 normal, outer and inner lobes carrying several strong spines, segment 1 of palp short, with seta at outer distal angle, segment 2 long and widening distally, several setae on inner margin and distal part and on surface; inner lobe of maxilla 2 shorter than outer, and fringed with spines of various lengths round apical margin and to about centre of inner margin, outer lobe with long spines on apical margin; inner lobe of maxilliped narrow at base, not reaching apex of segment 1 of palp, numerous feathered spines on inner margin and several spine-teeth, outer lobe reaching just beyond apex of segment 2 of palp, inner margin carrying some spines, and 5 or 6 rather distant spine-teeth, segment 1 of palp shorter than any of three following, segment 2 stoutest near base, not as much as twice as long as 1st, fringed with slender spines on inner margin, segment 3 almost as long as segment 2, with numerous long spines, especially about inner margin and apex.

Gnathopod 2 attached to rear part of pereonite II, its basal segment a little shorter than pereonite II, propodus a little longer than half of pereonite II, and more than six times as long as its greatest breadth, which projects and bears a grasping palmar spine medially, a triangular tooth at distal angle of palm, poison tooth situated nearly triangularly with a narrow notch, basic part of propodus very narrow.

Gills very long and narrow.

Pereopod 5 subequal to pereonite V, 5 to 7 increasing in length, propodus palm concave, grasping spines proximal.

Female: Body length of adult specimen 9.5 mm (Text-fig. 80, G); pereonites II, III and V subequal in length, pereonite IV a little shorter than III, VI and VII taken together a little shorter than V, I a little shorter than head; pereonite I with a single dorsal spine bent forward at hind end, pereonite II with a dorsal projection bent forward at hind end, and a pair of large projections on median part, pereonites III and IV each with dorsal projections bent forward at hind end, and a pair of large dorsal projections on median part, pereonite V with two pairs of dorsal projections, pereonites VI and VII with two pairs of dorsal projections.

Antenna 1 a little longer than half of body length, its flagellum 15-segmented;

antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached to near front of pereonite II, segment 1 not so long as propodus, propodus twice as long as broad, proximally with a projecting palmar angle bearing a spine, poison tooth situated near by triangular tooth at distal angle of palm. Gills elongate.

GROWTH: Male: A young specimen (Text-fig. 79, B) body length 19 mm;

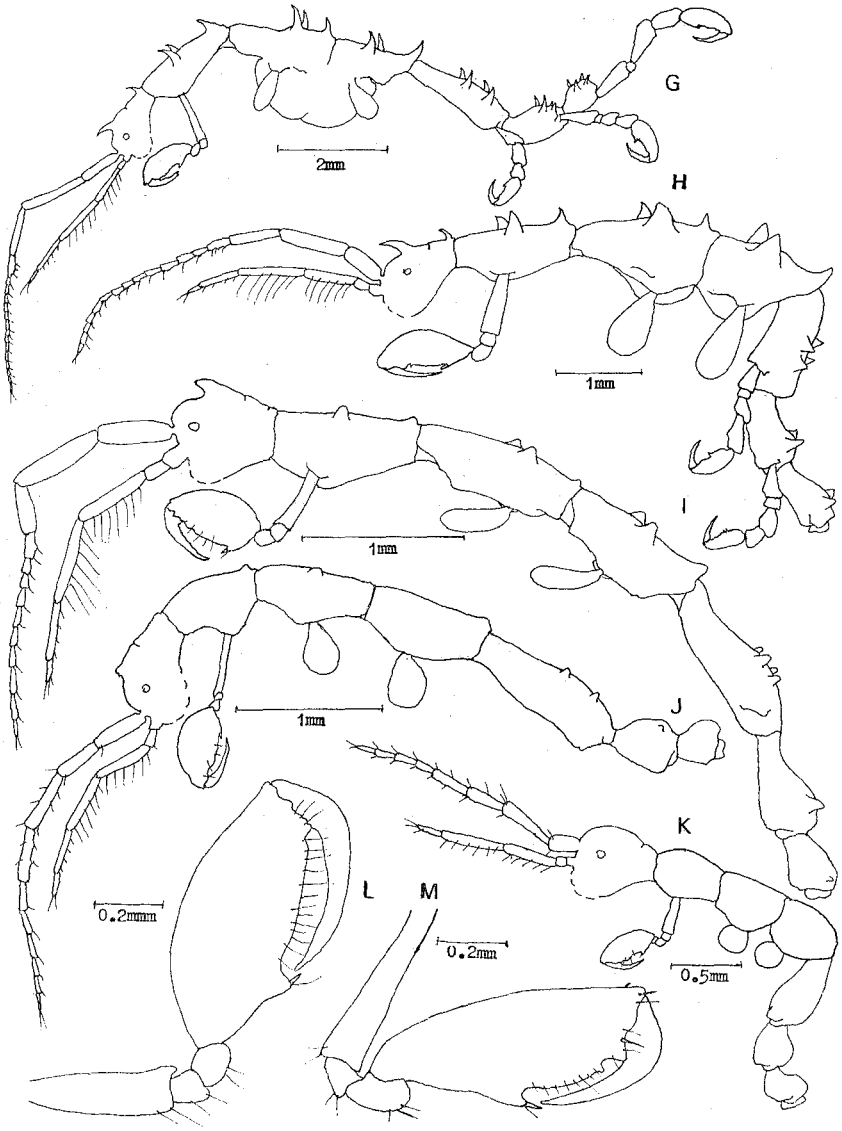

Fig. 80. *Caprella* (*Spincephala*) *scaura diceros* Mayer.
G, adult female (material from Usuki, Coll. no. 184); H, young female (material from Toyoura, Coll. no. 179); I, young female (material from Tateyama Bay, Coll. no. 2); J, young female (material from Kamo-ko, Coll. no. 382); K, female larva (material from Kamo-ko, Coll. no. 382); L, gnathopod 2 of young female; M, gnathopod 2 of adult female.

pereonite II longer than any other segments, V a little shorter than II, VI and VII taken together a little shorter than V, III and IV subequal and a little shorter than V, I a little shorter than III; pereonite I with a small dorsal upright spine at distal end, pereonite II with a pair of small dorsal tubercles on hind part, pereonite III with a small dorsal upright tooth on distal end, and a pair of dorsal tubercles on hind part, and lateral process on distal end, pereonite IV with a strong process curved backward at posterior end of back, and a lateral process on distal end, pereonite V with two pairs of dorsal processes on distal part, pereonite VI and VII with a pair of dorsal processes on hind part.

A young specimen (Text-fig. 79, C): Body length 16.8 mm; pereonites I and II smooth, pereonites III and IV with a lateral process on distal end, and a dorsal process on hind end of pereonite IV, somewhat but not sharply pointed backward. Antenna 1 a little shorter than half of body length, basal segments of flagellum with 7 segments but not clearly separate, and distal part 9-segmented; basal segment of gnathopod 2 a little longer than half of pereonite II, propodus about three-times as long as its greatest breadth.

A young specimen (Text-fig. 79, D): Body length 9 mm; pereonites III and IV subequal in length, V a little shorter than IV, VI and VII taken together a little shorter than V, II a little shorter than V, I a little shorter than head; pereonites I, II, III, IV, VI and VII smooth; basal part of flagellum of antenna 1 has 4 segments but not clearly separate, while distal part 10-segmented; antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached rather to the front part of pereonite II.

A larva specimen (Text-fig. 79, E): Body length 1.7 mm; head and body smooth; pereonite III longest of all segments, IV and V subequal in length and a little shorter than III, II a little shorter than V, I a little shorter than haed; antenna 1 a little shorter than half of body length, flagellum 4-segmented; antenna 2 about as long as antenna 1; gills circular.

A larva specimen (Text-fig. 79, F): Body length 0.8 mm; pereonite III longer than any other pereonites, pereonites II, IV and V subequal in length and a little shorter than III, pereonite VI a little shorter than V, VII a little shorter than VI, I a little shorter than VII; all pereonites smooth; antenna 1 as long as half of body legnth, its flagellum 3-segmented; antenna 2 a little shorter than antenna 1.

Female: A young specimen (Text-fig. 80, H): Body length 8 mm; pereonite III longest of all segments, pereonites II, IV and V subequal and a little shorter than III, VI a little shorter than V, VII a little shorter than VI, I about as long as half of head; pereonite VI and VII have each a pair of dorsal teeth on hind part; flagellum of antenna 1, 14-segmented; antenna 2 a little longer than peduncle of antenna 1.

A young specimen (Text-fig. 80, I): Body length 5.6 mm; pereonite V the longest of all segments, III a little shorter than V, II and IV subequal and a little shorter than III, VI and VII taken together as long as V, I as long as half of head; dorsal tubercle a little smaller than that in the young of 8 mm body length; flagellum of

antenna 1, 10-segmented; gills elongate.

A young specimen (Text-fig. 80, J): Body length 4.8 mm; pereonite V longest of all segments, III and IV subequal in length and a little shorter than V, II a little shorter than III, I about as long as half of head; basal part of flagellum of antenna 1 with 3 unseparated segments, plus of 6-segmented distal part.

A specimen (Text-fig. 80, K): Body length 3 mm; smooth, pereonite V longest of all pereonites, II, III and IV subequal in length and a little shorter than V, VI and VII taken together a little shorter than V; flagellum of antenna 1, 5-segmented; gnathopod 2 attached to middle part of pereonite II, propodus more than twice as long as its greatest breadth, which projects and bears a spine.

DISTRIBUTION: Type locality: Off Kobe, Japan, (Stebbing, 1888: 1257).

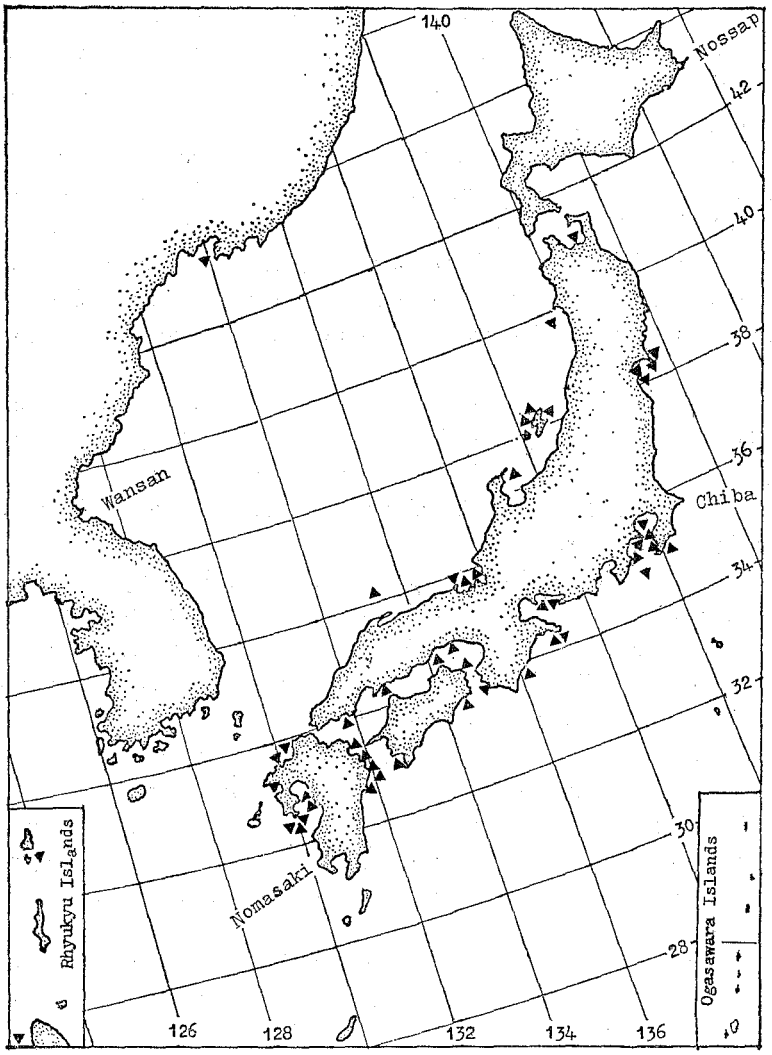

Fig. 81. Distribution records of *Caprella* (*Spinicephala*) *scaura diceros* Mayer around Japan.

Other localities around Japan: Awa-Kachiyama (Mayer, 1890: 70); Vladivostok (Mayer, 1903: 118); Tateyama Bay (Mayer, 1903: 118); Ohmori (Mayer, 1903: 118); Misaki (Mayer, 1903: 118); Enoura, (Mayer, 1903: 118); Nagasaki (Mayer, 1903: 118); Formosa Straits, 24° N., (Mayer, 1903: 118); Tanabe Bay (Utinomi, 1937: 314); Asamushi (Utinomi, 1934: 285); Onagawa (Utinomi, 1943: 279); Nanao Bay (Utinomi, 1947: 77); Gokasho Bay (Utinomi, 1947: 77); Kure (Utinomi, 1947: 77); Tomioka (Utinomi, 1947: 77); Ohmura Bay (Irie, 1958: 107); Tomioka (Kikuchi, 1962: 24); Sagami Bay (Ezaki, 1964: 68); Off Shiogama (Shiogama Fish. Exp. St. 1968, Coll. no. 238); Otomi (Yasuda and Arimoto, 1968, Coll. no. 270); Ohi-shi, Fukui Pref. (Tadashi Koba, 1968, Coll. no. 143); Matsushima Bay (Hitoharu Yazawa, 1969, Coll. no. 362); Ohshima, Yamaguchi Pref. (Ken Tateishi, 1970, Coll. no. 646); Off Ogashi, Akita Pref. (Arimoto, 1971: 44); Kominato (Arimoto, 1971: 44); Tomioka, Kanagawa (Arimoto, 1971: 44); Nonojima (Arimoto, 1971: 44); Off Shiba-cho (Arimoto, 1971: 44); Kamo-ko, Sado Island (Arimoto, 1971: 42); Tassha Bay, Sado Island (Arimoto, 1971: 42); Aikawa Bay, Sado Island (Arimoto, 1971: 42); Senkaku Ikkei, Sado Island (Arimoto, 1971: 42); Ohbama, Sado Island (Arimoto, 1971: 42); Off Toyoda, Sado Island (Arimoto, 1971: 42); Himezu, Sado Island (Arimoto, 1971: 42); Off Hutami, Sado Island (Arimoto, 1971: 42); Kodomari Bay, Wakasa, Fukui Pref. (Arimoto, 1971: 44); Off Chita-cho, Aichi Pref. (Arimoto, 1971: 44); Toyoura, Aichi Pref. (Arimoto, 1971: 44); Owase Bay, Mie Pref. (Arimoto, 1971: 44); Ago Bay, Mie Pref. (Arimoto, 1971: 44); Saigo Bay, Shimane Pref. (Arimoto, 1971: 44); Ushimado Bay, Okayama Pref. (Arimoto, 1971: 44); Shodoshima, Seto Inland Sea (Arimoto, 1971: 44); Uwajima Bay, Ehime Pref. (Arimoto, 1971: 44); Izari, Tokushima Pref. (Arimoto, 1971: 44); Najima Bay, Fukuoka Pref. (Arimoto, 1971: 44); Shinjuhama, Saga Pref. (Arimoto, 1971: 44); Shimaharahanto (Arimoto, 1971: 44); Shiranuhi Sea, Kumamoto Pref. (Arimoto, 1971: 44); Off Usuki, Ohita Pref. (Arimoto, 1971: 44); Nagoya-zaki, Ohita Pref. (Arimoto, 1971: 44); Off Kamae, Ohita Pref. (Arimoto, 1971: 44); Yonozu, Ohita Pref. (Arimoto, 1971: 44); Oshima Straits, Kagoshima Pref. (Arimoto, 1971: 44); Kugurizaka, Aomori Bay (Utinomi, 1973: 35).

Additional collection: Tateyama Bay (Arimoto, 1931: 16); Misaki (Utinomi, 1947: 77); Tomioka, Kumamoto Pref. (Utinomi, 1964: 14); Vladivostok (Vassilenko, 1967: 211); Kamae Bay (Utinomi, 1969: 302); Tomioka, Kanazawa, Kanagawa Pref. (Arimoto, 1971: 44).

50–(3) *Caprella* (*Spinicephala*) *scaura hamata* Utinomi, 1947

(Jap. name: *Sekagitoge-warekara* Utinomi, 1964)

Fig. 82.

No specimen in the author's collection.

Occurrence: Nanao Bay, collected by Miyadi and Masui, 5 males (Utinomi, 1947: 77); Asamushi, collected by Sando, (Sando, 1964: 31); Tomioka, collected by Kikuchi, 1962, 2 males, (Utinomi, in Kikuchi ed., 1964: 15).

DESCRIPTION: Reproduced from Utinomi, 1947.

Male: Body length of specimen 15 mm (Text-fig. 82, A), resembling *Caprella scaura diceros* in some characteristics, but differing from the latter in the following respects.

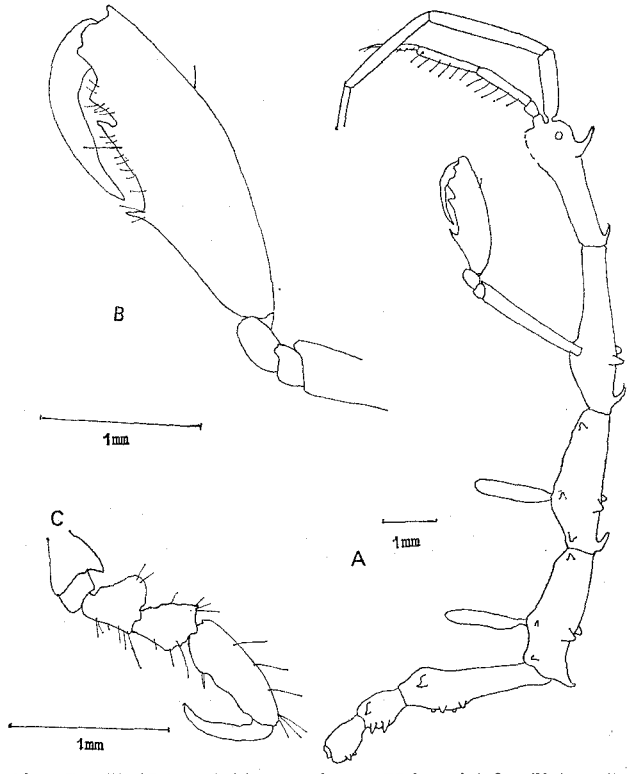

Fig. 82. *Caprella* (*Spinicephala*) *scaura hamata* Utinomi (after Utinomi).
A, adult male; B, propodus of gnathopod 2 of male; C, pereopod 5.

Pereonite I with one acute frontal spine, and pereonites II, III and IV having each a pair of dorsal processes on posterior part, and also bearing a sharp spine directed foreward on distal end of each segment, pereonites III and IV having three lateral processes (front, middle and rear) on lower lateral sides.

DISTRIBUTION: Type localities: Several localities in Japan.

Other localities around Japan: Nanao Bay (Utinomi, 1947: 77); Asamushi (Sandō, 1964: 31); Amakusa (Utinomi in Kikuchi, 1964: 15); Kugurizaka, Aomori Bay (Utinomi, 1973: 35).

51. *Caprella* (*Spinicephala*) *gigantochir* Mayer, 1903

(Jap. name: *Tenaga-warekara* Utinomi, 1964)

Figs. 83, 84.

Caprella gigantochir Mayer, 1903, Siboga Exped. Mon., 34: 103, pl. 4 fig. 14, pl. 8 figs. 7–9. —— Arimoto, 1931, Journ. Tokyo nat. Hist. Soc., 29 (41): 10–11, fig. 7. ——Hiro (=Utinomi), 1937, Annot. Zool. Japon., 16 (4): 314, pl. 22 figs. 9–10. ——Miyadi and Masui, 1942, Occ. Pap. Japanese

Oceanogr., 2 (1): 9–10. ——Utinomi, 1947, Seibutsu (suppl.), 1: 74. ——Utinomi, 1958, Col. Illustr. seashore Anim. Japan: 56, pl. 27 fig. 17. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14, pl. 1 fig. 1, pl. 3 figs. 10–11. ——Kikuchi, 1966, Publ. Amakusa mar. biol. Lab., 1 (1): tab. 21. ——Utinomi, 1968, Publ. Seto mar. biol. Lab., 16 (4): 287, fig. 5. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 22. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 17. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 33.

OCCURRENCE: Tateyama Bay, collected by Asajiro Oka, Apr. 15, 1895, Coll. no. 6; Kanazawa, Kanagawa, Pref., collected by Kanagawa Fish. Exp. St., Apr. 28, 1929, Coll. no. 81; Muroran, collected by Yaichiro Okada, Aug. 15, 1930, 1 male, 1 female, Coll. no. 105.

DESCRIPTION: Male: Body length of specimen 24 mm (Text-fig. 83, A), elongate and smooth except head; pereonite V longest of all segments, II a little

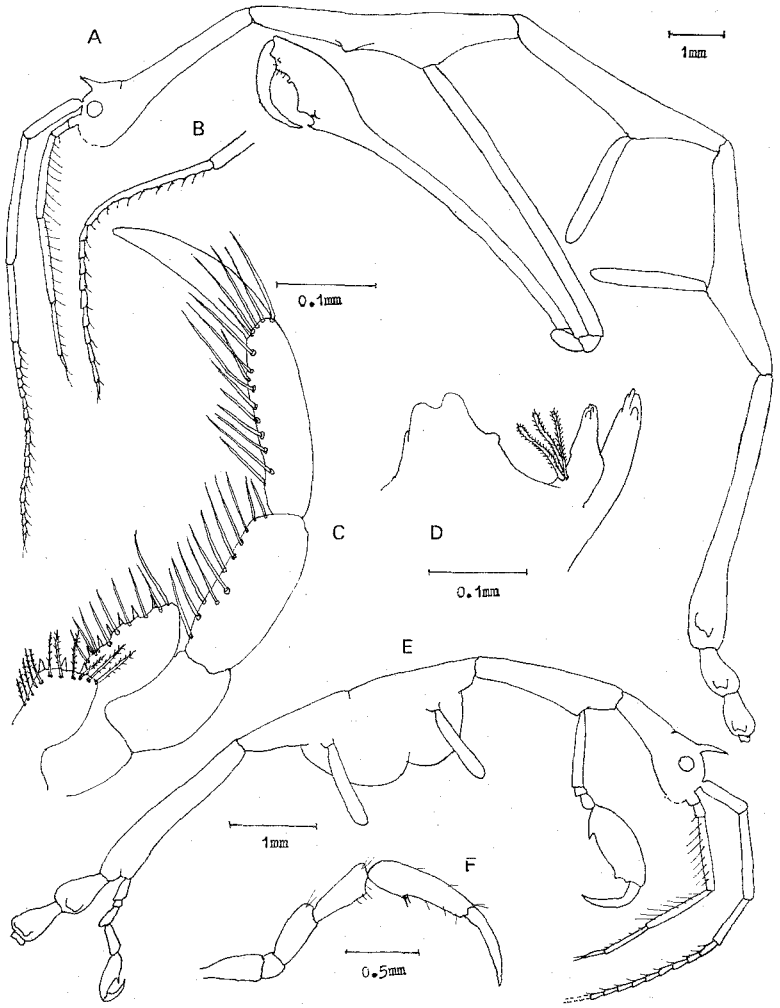

Fig. 83. *Caprella* (*Spinicephala*) *gigantochir* Mayer.
A, adult male; B, flagellum of antenna 1 of male; C, maxilliped; D, mandible; E, adult female; F, pereopod 5 of female (Arimoto, 1930).

shorter than V, III a little shorter than II, IV a little shorter than III, I a little shorter than IV, VI and VII taken together a little shorter than I; pereonite II with flat and triangular lateral tooth on each side of body, head bearing one acute frontal spine above.

Antenna 1 a little longer than one-third of body length, its flagellum a little shorter than peduncle, and about 17- to 20-segmented, but often basal 3–11 segments not separated; antenna 2 a little longer than peduncle of antenna 1.

Incisor of mandible divided into 5 large unequal teeth, lacinia mobilis apart from principal plate and much smaller, with its distal edge cut into numerous denticles, spine row consisting of 2 or 3, and with plumose setae, prominent molar with strongly denticulated crown; outer lobe of maxilla smaller than palp, and carrying

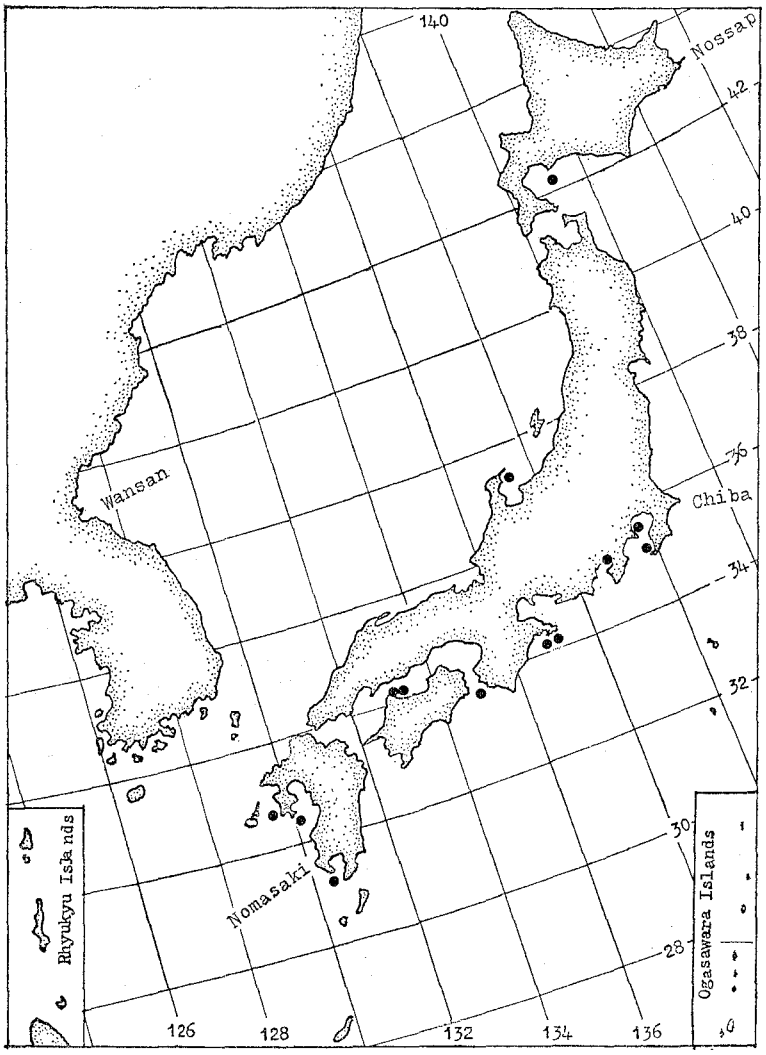

Fig. 84. Distribution records of *Caprella* (*Spinicephala*) *gigantochir* Mayer around Japan.

7 spines at dentate distal margin, segment 1 of palp a little shorter than broad, 2nd long, much overtops, and strongly dentate at apex and on inner margin; maxilla 2 usually present; inner lobe of maxilliped carrying three distant spine-teeth and several feathered spines at apical margin, outer lobe extending beyond segment 1 of palp, and with eight rather long spine teeth on straight side and several long spines on inner margin, segment 1 of palp short and stout, segment 2 with long spines at inner margin, segment 3 longer than 2, with several long spines at inner margin, dactylus strong.

Gnathopod 2 attached to rear part of pereonite II, basal segment longer than pereonite II, its propodus constuting the most important distinctive feature in that it is extremely long and spoon-shaped, has a palmar spine, and a subpalmar spine, poison tooth small, and triangular tooth on palmar margin in adult male, proximal part of propodus of gnathopod 2 exceedingly prolonged in the form of stalk which is longer than expanded palmar portion, but in young males this stalk-like portion is much shorter.

Gills long and linear.

Pereopod 5 a little shorter than pereonite V, pereopods 5 to 7 increasing in length, propodus of pereopod 7 with a pair of dentate grasping spines on about middle of palmar margin.

Adult female: Body length of specimen 10.3 mm (Text-fig. 83, E); pereonite I about as long as head; gnathopod 2 attached rather to front of pereonite II, basal segment a little shorter than half of pereonite II, propodus very different from male one in shape, more than twice as long as its greatest breadth, has a projecting setiferous tooth, and a subpalmar spine, poison tooth and triangular tooth very much smaller than in male.

DISTRIBUTION. Type localities: Enoura, Suruga Bay, and Nagasaki (Mayer, 1903: 103).

Other localities around Japan: Muroran (Yaichiro Okada, 1930, Coll. no. 105); Tateyama Bay (Arimoto, 1931: 10); Tanabe Bay (Hiro [Utinomi], 1937: 314); Nanao Bay, Ishikawa Pref. (Utinomi, 1947: 72); Hozaura, Mie Pref. (Utinomi, 1947: 74); Shisakajima, Ehime Pref. (Utinomi, 1947: 74); Hyakkanjima, Ehime Pref. (Utinomi, 1947: 74); Yamakawa, Kagoshima Pref. (Utinomi, 1947: 74); Yura-Kii, Wakayama Pref. (Utinomi, 1947: 74); Gokasho Bay, Mie Pref. (Utinomi, 1947: 74); Tomioka, Kumamoto Pref. (Kikuchi, 1962: 29–(4); Tomioka, Kanagawa Pref. (Arimoto, 1971: 17); Okinoshima, east of Sagami Bay (Utinomi, 1973: 33).

Additional collection: Tomioka (Utinomi, 1964: 14); Tanabe Bay (Utinomi, 1968: 287).

52. *Caprella* (*Spinicephala*) *rhopalochir* Mayer, 1890

(Jap. name: *Osate-warekara* Utinomi, 1964)

Fig. 85.

Caprella rhopalochir Mayer, 1890, Fauna Flora Golf. Neapel, 17: 80–81, pl. 5 fig. 40, pl. 7 figs.

45–47. ——Utinomi, 1947, Seibutsu (suppl.), 1: 76, fig. 6. ——Irie, 1958, Bull. Fac. Fish. Nagasaki Univ., 7: 89, 91. ——Irie, 1959, Bull. Fac. Fish. Nagasaki Univ., 8: tab. 4. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14, pl. 2 fig. 2, pl. 3 figs. 9. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 36. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 43.

OCCURRENCE: Shinjyuhama, Karatsu Bay, Saga Pref., collected by Atsushi Ichihara, May 28, 1968, 2 males, 1 female, Coll. no. 260.

DESCRIPTION: Male: Body length of specimen 15 mm (Text-fig. 85, A), elongate; pereonite II longest of all segments, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, I a little shorter than V, VI and VII taken together a little shorter than V; head with one acute frontal spine, pereonite I smooth, pereonite II with one pair of dorsal projections, pereonite III and IV each with one process on median part of back, pereonite V with one pair of dorsal projections, pereonites VI and VII smooth.

Antenna 1 as long as two-thirds of body length, its flagellum 12-segmented; antenna 2 a little longer than half of peduncle of antenna 1; gnathopod 2 most peculiar,

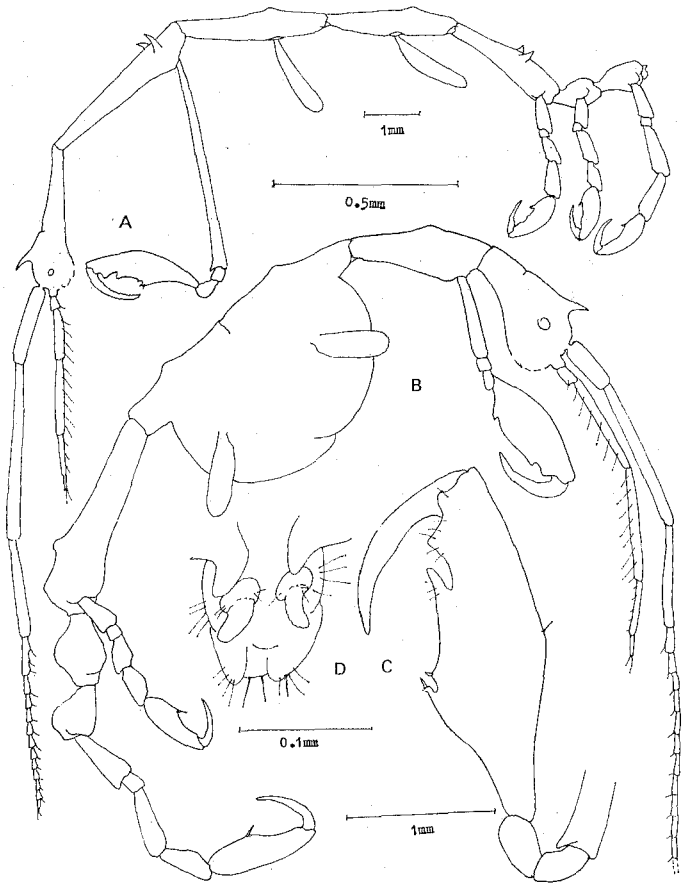

Fig. 85. *Caprella (Spinicephala) rhopalochir* Mayer.
A, adult male (material from Shinjuhama, Coll. no. 260); B, adult female (ditto); C, propodus of gnathopod 2 of adult male; D, abdomen of male.

attached to rear part of pereonite II, its basal segment longer than pereonite II, propodus a little shorter than pereonite II, and three-times as long as its greatest breadth, setiferous with a palmar spine and subpalmar spine when projecting, basal part of propodus very narrow, poison tooth situated near by a triangular tooth at distal angle of palm, leaving a narrow notch in between.

Gills long and elongate.

Pereopod 5 longer than pereonite V, and length of pereopods increasing from 5 to 7, propodus with a pair of dentate grasping spines near middle on palmar margin.

Penes clearly separated.

Female: Body length of adult specimen 2.5 mm (Text-fig. 85, B); pereonite V longest of all segments, III a little shorter than V, II and IV subequal in length and a little shorter than III, VI and VII taken together a little shorter than IV, I about as long as half of head; pereonites II-V each with one small process on back.

Antenna 1 a little shorter than body length; antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached to fore end of pereonite II, its basal segment a little shorter than pereonite II, propodus a little longer than basal segment, and more than twice as long as its greatest breadth, basal part of propodus not narrow like in male; gills elongate.

DISTRIBUTION: Type locality: "Reise von China nach der Amurmundung", China (Mayer, 1890: 80).

Other localities around Japan: Okinoshima, Fukuoka Pref. (Utinomi, 1947: 75); Sasebo (Irie, 1958: 91); West of Makurashima, Nagasaki Pref. (Irie, 1959: tab. 4, 20 meters, on algae); Amakusa (Utinomi and Kikuchi, 1964: 14); Shinjuhama, Saga Pref. (Arimoto, 1971: 44).

REMARKS: Mayer's specimen has many spines on body; thus, pereonite I with a projection on distal end of back, pereonite II with two pairs of dorsal projections and lateral spine above point of attachment of gnathopods 2, pereonite III with two pairs of dorsal projections and lateral spine at fore end, pereonite IV with two pairs of dorsal projections, pereonite V with a pair of dorsal projections and sometimes an additional pair of dorsal tubercles; these features seem to indicate that the specimen is a well-developed adult.

Female was first collected by A. Ichihara in Japan in May, 1968.

53. *Caprella* (*Spinicephala*) *simia* Mayer, 1903

(Jap. name: *Kamate-warekara* Utinomi, 1964)

Figs. 86, 87, 88.

Caprella simia Mayer, 1903, Siboga Exped. Mon., 34: 123–124, pl. 5 fig. 31, pl. 8 fig. 25. —— Walker, 1909, Trans. Linn. Soc. London, (2) 12 (4): 326, 344. ——Hiro (=Utinomi), 1937, Annot. Zool. Japon., 16 (4): 315–316, pl. 22 fig. 13. ——Utinomi, 1947, Seibutsu (suppl.), 1: 78. ——Stschapova, Mokyevsky and Pasternak, 1957, Trudy Okeanol. Akad. Nauk USSR, 23: 87. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 15, pl. 3 fig. 4. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 41. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 45. —— Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 36.

Caprella Tateyamensis Arimoto, 1930, Journ. Tokyo Nat. Hist. Soc., 28 (39): 54–56, pl. 2 figs. 12–20. Type locality: Tateyama, Japan.

OCCURRENCE: Tanabe Bay, collected by Asajiro Oka, Nov. 22, 1915, 1 male, Coll. no. 117; Gokasho Bay, collected by Arimoto, Dec. 20, 1925, 1 male, Coll. no. 96; Off Odawara, collected by Arimoto, Nov. 25, 1927, 1 male, Coll. no. 98; Tateyama Bay, collected by Arimoto, Aug. 21, 1928, attached to *Bugula*, 1 male, Coll. no. 46, 1 male, Coll. no. 62; Hachijojima, collected by Tadashi Fujita, Aug. 7, 1929, attached to *Gelidium*, 1 male, Coll. no. 83; Kanazawa, Kanagawa Pref., collected by Arimoto, Apr. 28, 1929, 3 males, Coll. no. 95; Misaki, collected by Arimoto, Jun. 25, 1929, 1 male, Coll. no. 97; Shodoshima, collected by Tomoyuki Fujimoto, Mar. 7, 1967, 1 male, Coll. no. 71; Off Ohyodo, Mie Pref., collected by Isewan Fish.

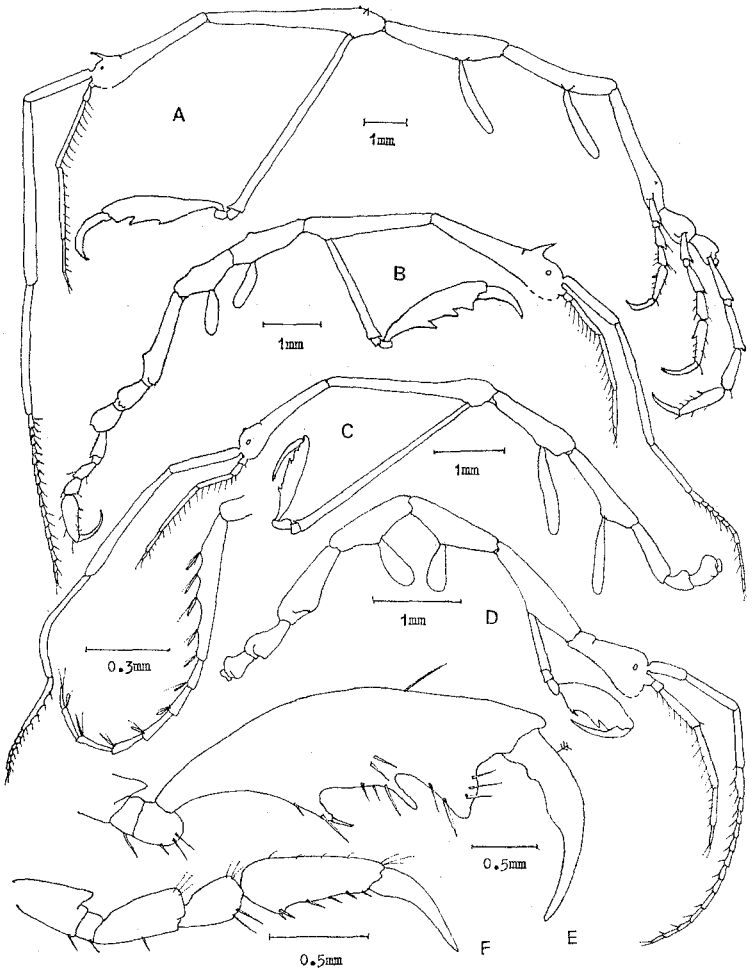

Fig. 86. *Caprella (Spinicephala) simia* Mayer.
A, adult male (material from Kanagawa, Coll. no. 95); B, adult male (Arimoto, 1930); C, young male (material from Tanabe Bay, Coll. no. 89; E, propodus of gnathopod 2 of adult male; F. pereopod 7 of 10.5 mm body length male.

Exp. St., Jun. 25, 1968, 4 males, 1 female, Coll. no. 298.

DESCRIPTION: Male: Body length of adult specimen 17 mm (Text-fig. 86, A), slender, and almost smooth; pereonite II longest of the pereonites, V a little shorter than II, III a little shorter than V, IV a little shorter than III, I a little shorter than IV, VI and VII taken together a little shorter than I; head bearing one acute frontal spine above, pereonite II with a pair of minute spinules on dorsal side at point of articulation of gnathopod 2.

Antenna 1 exceedingly long and a little shorter than body length, its flagellum 16-segmented; antenna 2 a little shorter than peduncle of antenna 1.

Incisor of mandible divided into five teeth, lacinia mobilis slightly toothed, setal row of 2 or 3 plumose setae, prominent molar with denticulate crown; maxillae 1 and 2 as usual; inner lobe of maxilliped with two distant spine-teeth and several feathered spines on inner and apical margin, outer lobe extending a little beyond 1st segment of palp, with six distant spine-teeth and several long spines on inner

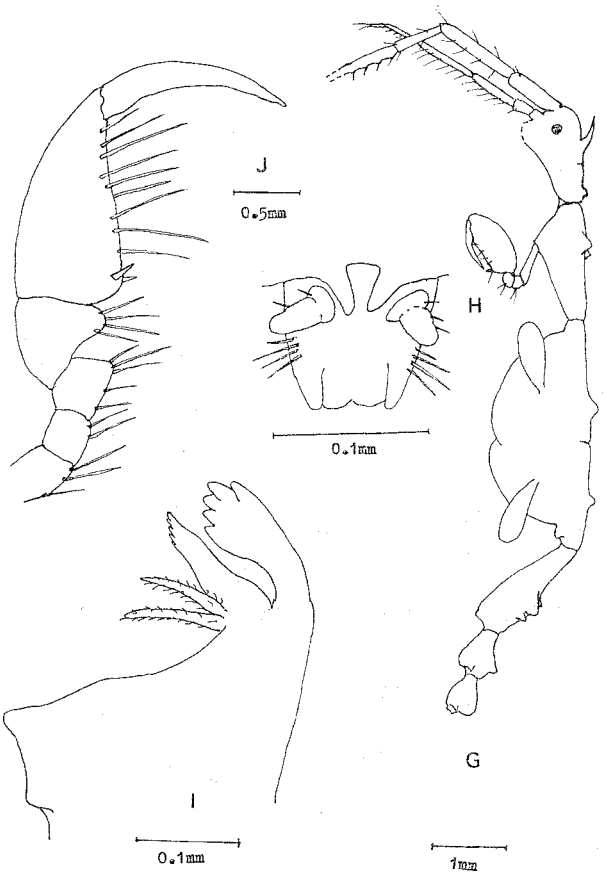

Fig. 87. *Caprella (Spinicephala) simia* Mayer.
G, adult female (material from Ohyodo, Ise Bay, Mie Pref., Coll. no. 298); H, abdomen of male; I, mandible; J, gnathopod 1.

margin, palp normal.

Segment 1 of gnathopod 1 a little longer than its breadth, segment 2 a little shorter than 1, segment 3 a little longer than 2, wrist longer than 3, widening distally from narrow base, with numerous spines along inner margin, propodus much longer and wider than wrist, narrowing to distal end, and with several long spines. Gnathopod 2 attached to rear-end of pereonite II, basal segment of peduncle longer than pereonite II, propodus elongate without stalk such as that seen in *C.* (*Spin.*) *gigantochir*, median tooth on palm stronger and more acute than in *C.* (*Spin.*) *gigantochir*, poison tooth long, triangular tooth large.

Gills long and linear.

Pereopod 5 a little shorter than pereonite V, 6 longer than 5, 7 a little shorter

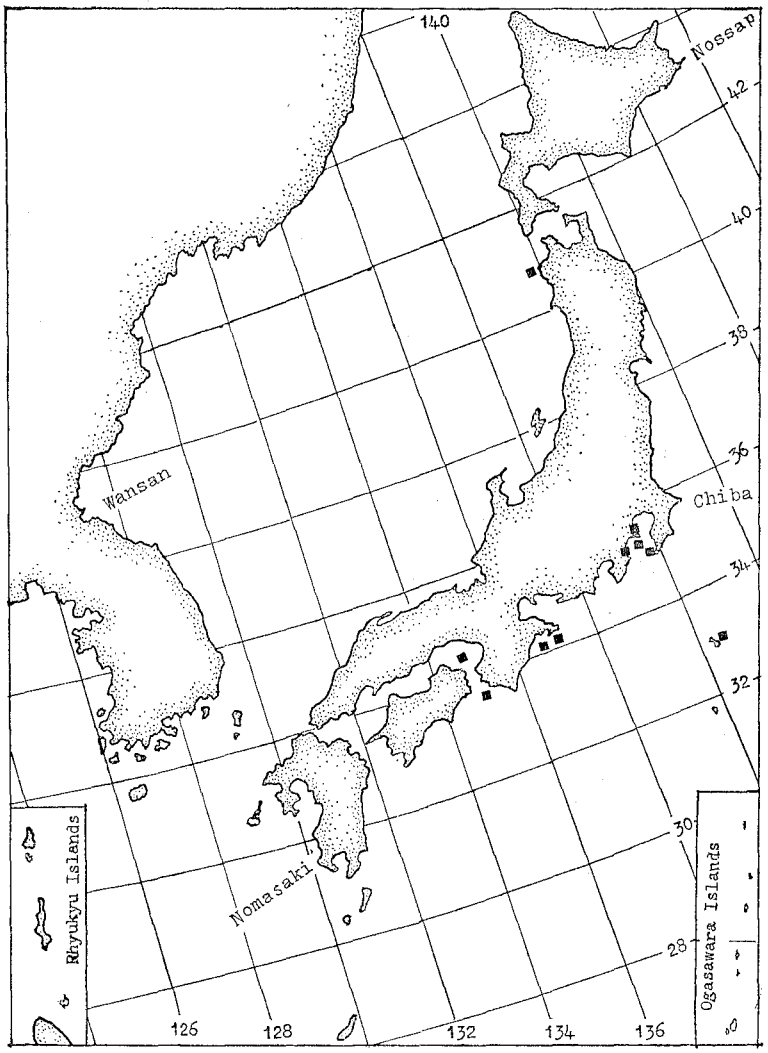

Fig. 88. Distribution records of *Caprella* (*Spinicephala*) *simia* Mayer around Japan.

than twice the length of 5, propodus in pereopods 5–7 each with clasping spines proximally.

Abdomen of male, typical of the genus.

GROWTH: Adult male: Body length of specimen 10.5 mm (Test-fig. 86, B); pereonites III and IV each with a minute process on middle of back, pereonite V with a pair of dorsal processes on rear part; antenna 1 a little longer than half of body length, its flagellum 13-segmented; gills elongate.

Young male: Body length of specimen 8 mm (Text-fig. 86, C); pereonites smooth, head with a minute tubercle on back; antenna 1 a little shorter than body length, basal five segments of flagellum of antenna 1 not separated, while distal part 9-segmented; basal segment of gnathopod 2 longer than pereonite II.

Young male: Body length of specimen 6 mm (Text-fig. 86, D), smooth; pereonite II longest of all segments, III a little shorter than II, IV and V subequal in length and a little shorter than III, head smooth; flagellum of antenna 1 a little longer than its peduncle, and composed of 13 segments; basal segment of gnathopod 2 a little longer than half of pereonite II, propodus of gnathopod 2 more than twice as long as its greatest breadth.

Female: Body length of specimen 9 mm (Text-fig. 87, G); pereonites II, III and V subequal in length, IV a little shorter than V, VI and VII taken together a little shorter than V, I a little shorter than head; head bearing one acute frontal spine dorsally, pereonite I with a single dorsal tubercle at distal end, pereonite II with a pair of tubercles on median part of back, pereonites III and IV each with a tubercle on median part of back, pereonite V with two pairs of tubercles on rear part of back; gnathopod 2 attached rather to the front of pereonite II, its basal segment very short compared to pereonite II, propodus longer than segment 1, and more than twice as long as its greatest breadth.

DISTRIBUTION: Type localities: Enoura (Mayer, 1903: 123) and Nagasaki (Mayer, 1903: 123).

Other localities around Japan: Korea Straits (Mayer, 1903: 123); Tanabe Bay (collected by Asajiro Oka, 1924, Coll. no. 89); Tateyama Bay (Arimoto, 1931: 22); Hachijojima (Arimoto, 1971: 46); Kanazawa, Kanagawa Pref. (Arimoto, 1971: 46); Misaki (Arimoto, 1971: 46); Off Odawara (Arimoto, 1971: 46); Ohyodo, Ise Bay, Mie Pref. (Arimoto, 1971: 46); Gokasho Bay (Arimoto, 1971: 46); Shodoshima (Arimoto, 1971: 46); Bentenjima, Fukaura, Aomori Pref. (Utinomi, 1973: 36).

Additional collection: Tateyama Bay (collected by Arimoto, 1928, Coll. no. 62).

54. *Caprella* (*Spinicephala*) *vidua* Mayer, 1903

(Jap. name: *Goke-warekara* Arimoto, 1971)

Fig. 89.

Caprella vidua Mayer, 1903, Siboga Exped. Mon., 34: 128, pl. 5 figs. 37–38, pl. 8 figs. 32–34. —— Utinomi, 1947, Seibutsu (suppl.), 1: 80. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 46. ——

Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 47.

No specimen in the author's collection.

OCCURRENCE: 33°5′ N., 128°22′ E., collected by Schonau in July 1893, 1 male, depth 46 meters; 33° N., 129°25′ E., collected by Suenson, in 1898, 1 young female, depth 56 meters; 33° N., 129° E., collected by Schonau, in 1898, 2 females, depth 41–56 meters. (Mayer, 1903: 128).

DESCRIPTION: Reproduced from Mayer's description (1903).

Male: Body length of adult specimen 5 mm (Text-fig. 89, A); pereonite V longest of all segments, III and IV subequal in length and a little shorter than V, II a little shorter than III, VI and VII taken together a little shorter than V, I about as long as half of head; head with one acute frontal spine dorsally, pereonite I armed with a pair of forward bent dorsal spines at hind back, pereonite II with a pair of strong projections on median part of back and a pair of small tubercles at hind end, a lateral tooth placed just above point of attachment gnathopod 2, pereonite III with a pair of dorsal tubercles medially and a lateral tubercle in fore part of each side, pereonite IV with two pairs of dorsal tubercles at median and hind end and a lateral tubercle at hind end, pereonite V with a pair of dorsal tubercles on rear part of back.

Antenna 1 a little longer than half of body length, its flagellum 11-segmented;

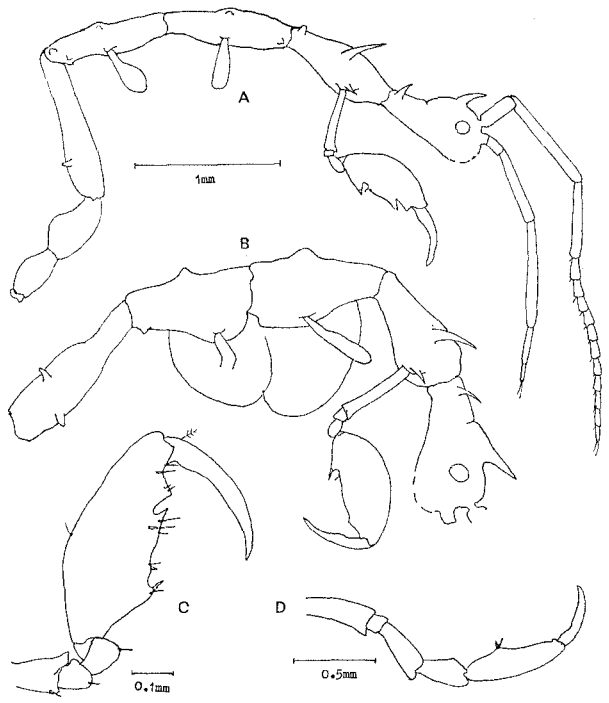

Fig. 89. *Caprella* (*Spinicephala*) *vidua* Mayer (after Mayer).
A, adult male; B, adult female; C, propodus of gnathopod 2 of male; D, Pereopod 7 female.

antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached rather to front part of pereonite II, its basal segment as long as half of pereonite II, propodus large and more than twice as long as its greatest breadth, which forms a produced setiferous portion with a palmar spine and a subpalmar spine, poison tooth situated nearly triangular in position with a narrower notch, and a triangular tooth at distal angle of palm; gills elongate.

Female: Body length of specimen 2.5 mm (Text-fig. 89, B); pereonite V longest of all segments, III not as long as V, IV a little shorter than III, II a little shorter than IV, I a little longer than half of head; pereonites I and II each with a pair of sharp dorsal projections bent foreward, pereonites III and IV each with a large tubercle at middle of back, pereonite V with a pair of projections on rear part of back; flagellum of antenna 1, 12-segmented; gnathopod 2 attached to near front part of pereonite II, propodus a little shorter than pereonite II, poison tooth and triangular tooth projection indistinct; gills longer than those of males; propodus of pereopods 5–7 each with a pair of grasping spines.

DISTRIBUTION: Type localities: 33°00′ N., 129°25′ E., 90 meters; 33°00′ N., 129°00′ E., 66–90 meters; 33°05′ N., 128°22′ E., 75 meters.

Other localities around Japan and adjacent waters: Yellow Sea, 54.6 meters (Mayer, 1903: 128); west of Goto Islands (Mayer, 1903: 128).

55. *Caprella (Spinicephala) cilluroantennata* Arimoto, 1934

(Jap. name: *Himetoge-warekara* Arimoto, 1971)

Fig. 90.

Caprella cilluroantennata Arimoto, 1934, Dobutu.-Zasshi, 46 (553): 501–503, pl. 1 fig. 12, pl. 2 figs. 12–13, pl. 3 figs. 3, 4, 9, 14, 20, 23, 30, 31. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 15. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 14.

OCCURRENCE: 40°30′ N., 141°51′ E. (Off Hachinohe Bay), collected by T/S Sōyō-maru of Fisheries Experiment Station of Department of Agriculture and Forestry, Nov. 2, 1926, depth 91 meters, sand, temp. 16.0° C, St. 85, 1 male, Coll. no. 503.

DESCRIPTION: Male: Holotype: Body length of adult specimen 23 mm (Fig. 90, A), slender, with many small tubercles scattered on body surface; pereonite II longest of all segments, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, I a little shorter than V, VI and VII taken together a little shorter than I; head provided with a pair of short dorsal processes, pereonite III and IV each with a ventro-lateral process on side situated at fore end, pereonite V with 3 pairs of dorsal processes, both pereonite VI and VII each with a pair of dorsal processes.

Antenna 1 a little longer than half of body length, all peduncles have many long cilia, flagellum about two-thirds of peduncle and 18-segmented; antenna 2 a little shorter than peduncle of antenna 1, segment 1 of flagellum with 6–7 short spines on inner margin; incisor of mandible strongly projecting and divided into 5 teeth, lacinia mobilis slightly toothed, setal row of 2 or 3 plumose setae, with molar

process and circular denticulate small crown; outer lobe of maxilla 1 in rectangular form and with 7 fork-like two branched spines at apex, segment 1 of palp shorter than its breadth, segment 2 of palp longer than outer lobe, well overtopping the adjacent lobe, and carries 2 spine-teeth at inner and apical margins, the inner spines very small, but outer ones very strong, and many long spines on surface below these; maxilla 2 as usual; inner lobe of maxilliped carrying 2 spine-teeth distantly separated and several feathered spines planted on or little below margin, outer lobe extending a little beyond first segment of palp and denticulated into 8, inner margin with several spines, segment 1 of palp short and stout, segment 2 with many long spines on inner margin, segment 3 about as long as segment 2, with spines crowded especially on inner surface.

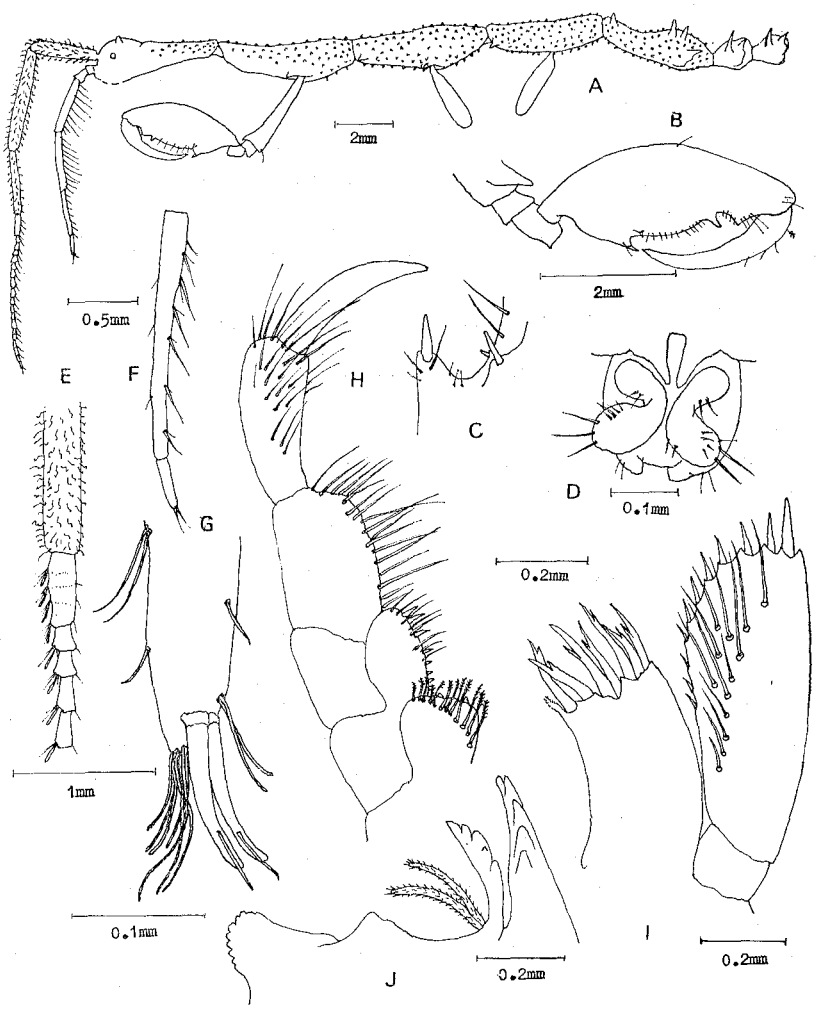

Fig. 90. *Caprella* (*Spinicephala*) *cilluroantennata* Arimoto.
A, adult male; B, propodus of gnathopod 2 of adult male; C, subpalmar spines of gnathopod 2; D, abdomen of male; E, a part of antenna 1; F, flagellum of antenna 2; G, apical part of antenna 2; H, maxilliped; I, maxilla 1; J, mandible (Arimoto, 1934).

Gnathopod 2 attached to rear part of pereonite II, its segment 1 a little longer than half of pereonite II, propodus about as long as pereonite II, and about as long as three-times its greatest breadth, and shows a projecting setiferous portion with a palmar tooth, poison tooth situated near by a triangular tooth at distal angle of palm, leaving a narrow notch in between, palm margin slightly convex, and with two subpalmar spines and setae; gills elongated.

Abdomen, penes medial with a pair of appendages and a pair of lobes.

DISTRIBUTION: Type locality: Off Hachinohe Bay, Aomori Pref.

56. *Caprella (Spinicephala) acanthogaster* Mayer, 1890

(Jap. name: *Ibara-warekara* Utinomi)

Figs. 91, 92, 93.

Caprella acanthogaster Mayer, 1890, Fauna Flora Golf. Neapel, 17: 80, pl. 7 figs. 52–53. ——Mayer, 1903, Siboga Exped. Mon., 34: 78–79, pl. 3 fig. 3. ——Schurin, 1937, Explor. Mers USSR, 23: 25–26, figs. 3–4. ——Utinomi, 1943, Sci. Rep. Tohoku imp. Univ., (Biol. 4) 17 (3): 271–273, fig. 1. ——Utinomi, 1943, Sci. Rep. Tohoku imp. Univ., (Biol. 4) 17 (3): 281–282, fig. 1. ——Utinomi, 1947, Seibutsu (suppl.), 1: 71. ——Sando, 1964, Bull. Mar. Biol. Sta. Asamushi, 12 (1): 31. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 11. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 13. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 1973, 29 (5): 31.

OCCURRENCE: Off Date-cho, collected by Terunori Kobayashi, Oct. 1, 1967, 12 males, 1 female, attached to *Undaria pinnatifida* farming net, Coll. no. 171; Wakkanai, collected by Wakkanai Fish. Exp. St., Sep. 16, 1968, 19 males, 5 females, attached to set nets, Coll. no. 330; Abashiri, collected by Saizaburo Komatsu, May 28, 1968, 6 males, 1 female, Coll. no. 257; Akkeshi, collected by Akkeshi High-school of Fisheries, Sep. 16, 1968, 4 males, 4 females, Coll. no. 324; Off Toyoura, collected by Hakodate Fisher. Exp. Sta., Aug. 19, 1968, taken from scallop farming nets, many males and females; Off Sawara, collected by Hakodate Fisher. Exp. Sta., Aug. 19, 1968, attached to scallop farming nets, numerous males and females. Coll. no. 317; Off Kanida-cho, collected by Yuji Tominaga, June 8, 1968, 1 male, attached to set nets. Coll. no. 304, many males and females attached to scallop farming nets, Coll. no. 51; Off Aomori-shi, collected by Kimio Ito, Apr. 22, 1968, many males and females, attached to scallop farming nets, Coll. no. 219, 1 male, 3 females, depth 5 meters, Coll. no. 218; Mutsu Bay, collected by Toyozo Kudo, Apr. 10, 1968, 2 males, 2 females, attached to scallop farming nets, Coll. no. 221; 8 meales, taken from pearl oyster nets, Coll. no. 222; Ohfunado Bay, Iwate Pref., collected by Nobusuke Nakamoto, May 6, 1968, many males and females, Coll. no. 232, 7 males, Coll. no. 233; Kamaishi Bay, collected by Yuukichi Niinuma, May 17, 1968, 10 males, 7 females, attached to *Undaria pinnatifida* farming rope, Coll. no. 236; Noda Bay, collected by Kuji Fish. Office, June 4, 1968, many males and females, taken from *Undaria pinnatifida* farming rope, Coll. no. 275; Off Takata-shi, Iwate Pref., collected by Takao Inao, Mar. 2, 1968, 6 males, 2 females, attached to *Undaria pinnatifida* farming rope, Coll. no. 170; Tsurugaura off Kesennuma, collected by Kesennuma branch of Miyagi

Fisher. Exp. Sta., May 1, 1968, 15 males, 4 females, Coll. no. 214; Hirota Bay, collected by Iwate Fisher. Exp. Sta., Apr. 4, 1968, many males and females, attached to *Undaria pinnatifida*, Coll. no. 180; Kesennuma Bay, collected by Miyagi Fisher. Exp. Sta., Apr. 20, 1968, many males and females, Coll. no. 209, Mar. 15, 1968, many males and females, Coll. no. 164; Tsurugaura Bay, Miyagi Pref., collected by Kesennuma Fisher. Exp. Sta., May 1, 1968, 19 males, 3 females, Coll. no. 214; Aise Bay, Ibaragi Pref., collected by Kumeji Suzuki, Jul. 24, 1968, 9 males, 3 females, attached to set nets, Coll. no. 284; 34°02′ N., 122°17′ E. (Yellow Sea), collected by Keisuke Okada, Nov. 20, 1968, depth 30 meters, many males and females, Coll. no. 337.

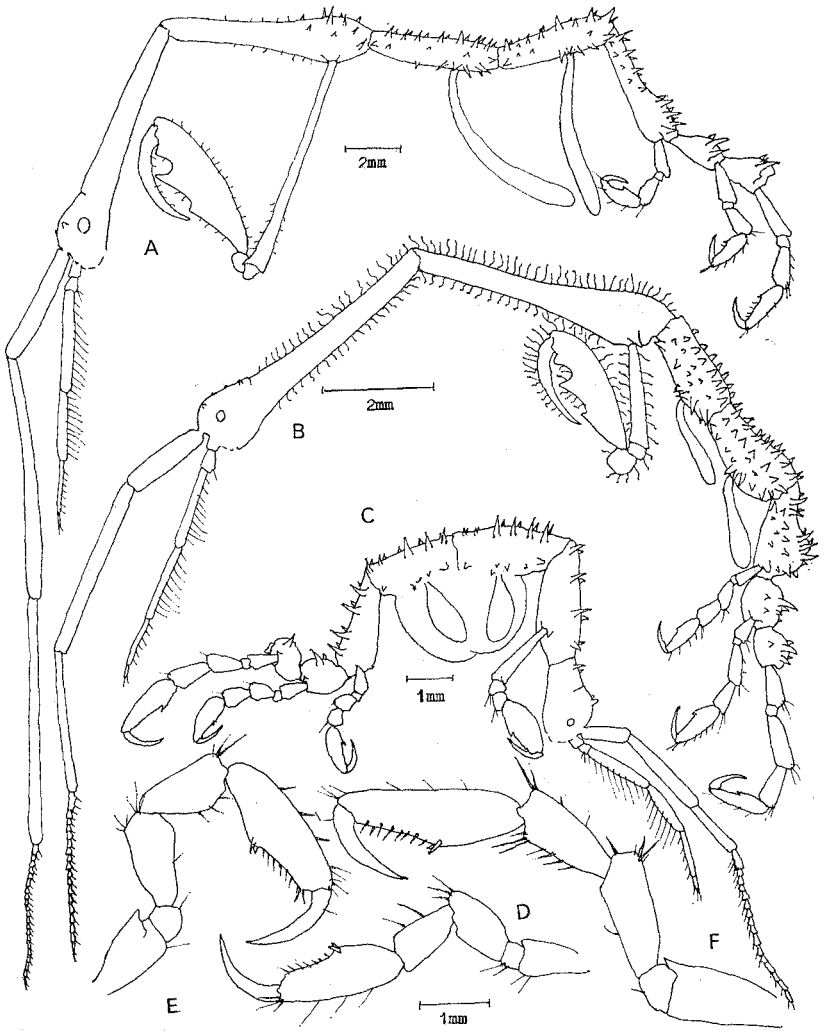

Fig. 91. *Caprella (Spinicephala) acanthogaster* Mayer.
A, adult male (material from Kesennuma Bay, Coll. no. 214); B, adult male (ditto, Coll. no. 164); C, adult female (material from Hirota Bay, Coll. no. 120); D, pereopod 5; E, pereopod 6; F, pereopod 7.

DESCRIPTION: Male: Very old males over 42 mm in length are met with not rarely (Utinomi, 1943), but adult specimens are usually 34 mm long (Fig. 91, A). The species is characterized in both sexes by numerous pairs of strong spines on back and also by strong spines arranged in a row around base of gills. Pereonite II longest of all segments, pereonite I a little shorter than II, pereonites III, IV and V subequal in length, and a little shorter than I, VI and VII taken together a little shorter than V; head with a pair of very small tubercles, pereonite II with 4 pairs of spines on back, a lateral spine on distal end on each side, and with little sensory hairs on body surface on distal part, pereonite III with 7 pairs of dorsal spines, a lateral spine on fore part and distal end on each side, and three large spines arranged in a row around base of gills, and further several lateral spines, pereonite IV with 8 pairs of dorsal spines, a lateral spine on fore part and distal end, and three large spines around base of gill, and further several lateral spines, pereonite V with 7 pairs of dorsal spines and several lateral spines, pereonite VI nad VII each with 1–2 pairs of dorsal spines.

Antenna 1 very long, a little shorter than body length, its peduncle very long, with short flagellum which is a little longer than segment 1 of peduncle and 21-segmented; antenna 2 a little shorter than half of peduncle of antenna 1; mandible has molar; outer lobe of maxilla 1 with 8 spinules on apical margin; gnathopod 2 attached to rear end of pereonite II, its segment 1 a little longer than pereonite II, propodus a little shorter than segment 1 and more than twice as long as its greatest breadth, setiferous when projecting, large poison tooth set in nearly triangular position with deep narrow notch, a triangular tooth at distal angle of palm, palmar projections about median of palm, sometimes having many little sensory hairs on surface of propodus; gills very much longer than its attached segment, and linear; pereopod 5 subequal to pereonite V in length, pereopod 6 a little longer than 5, 7 a little longer than 6, whose propodus has a pair of grasping spines medially on palmar margin, and several spines on palmar margin, outer margin with groups of slender spines at four points.

Female: Body length of adult specimen 12.5 mm (Fig. 91, C); pereonites II and III subequal in length and the longest of all segments, pereonites IV and V subequal and a little shorter than III, pereonites VI and VII taken together a little shorter than V, I a little shorter than head; head with a pair of tubercles on back, pereonite I with a pair of spines on back, pereonite II with 4 pairs of dorsal spines, pereonite III with 6 pairs of dorsal spines, a lateral process on fore part and distal end on each side, and further three small spines above the base of gills, pereonite IV with 5 pairs of dorsal spines, a lateral spine on fore end and distal end, and three small spines above the base of gills, pereonite V with 4 pairs of dorsal spines, pereonite VI and VII each with a pair of spines on back.

Antenna 1 a little longer than half of body length, its flagellum a little shorter than peduncle and 16-segmented; antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached rather to front part of pereonite II, its segment 1 a little longer than half of pereonite II, propodus as long as segment 1, poison tooth smaller

than that of male. Gill elongate, and shorter than that of pereonites III or IV.

GROWTH: This species undergoes an especially unusual transformation.

A male specimen 19 mm long (Fig. 91, B): Pereonite II longest of all segments, I a little shorter than II, III and IV subequal in length, and a little longer than one-third of pereonite II, V a little shorter than IV, VI and VII taken together a little shorter than V; head with a pair of small tubercles, pereonite I smooth, but having many long sensory hairs all over the surface of body, pereonite II with many sensory hairs on body surface, pereonite III with 7 pairs of dorsal spines, pereonite IV with 7 pairs of dorsal spines, pereonite V with 6 pairs of dorsal spines, both pereonite VI and VII each with 2 pairs of dorsal spines.

Antenna 1 a little longer than half of body length, its flagellum a little shorter than half of the peduncle and 18-segmented; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to distal end of pereonite II, its segment 1 a little longer than half of pereonite II, propodus a little longer than segment 1, and having many long sensory hairs all over its surface; gills elongate and a little shorter than the attached segment.

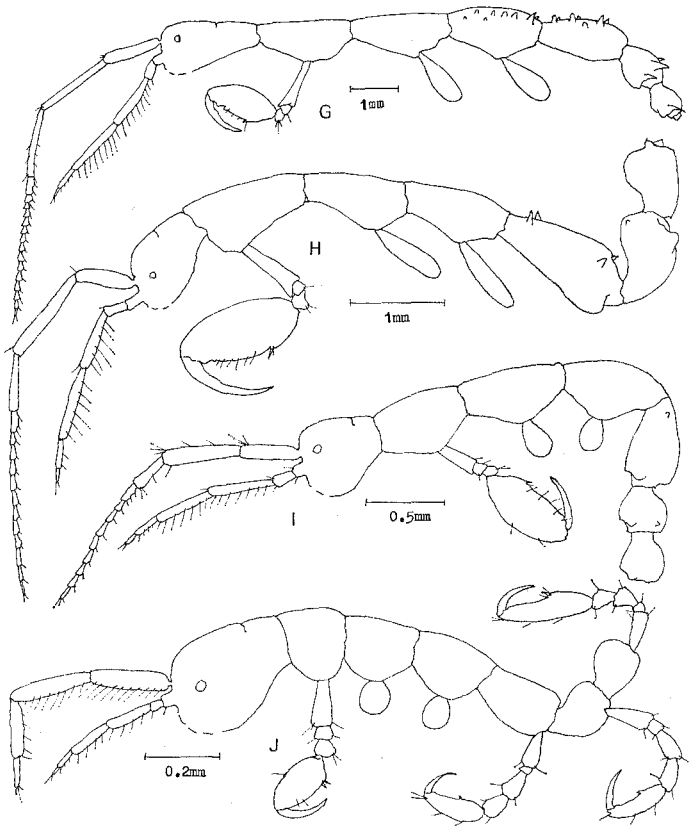

Fig. 92. *Caprella* (*Spinicephala*) *acanthogaster* Mayer.
G, young male (material from the Yellow Sea., Coll. no. 377); H, young male (ditto); I, young male (ditto); J, larva (ditto).

A male specimen 12 mm long (Fig. 92, G): Pereonites II, III and IV all subequal in length, and the longest of all segments, V a little shorter than IV, pereonites VI and VII taken together a little shorter than V, I about as long as head; pereonites I, II and III smooth, pereonite IV with 5 pairs of dorsal tubercles and two small lateral tubercles on each side, pereonite V with 3–4 dorsal tubercles, pereonite VI with a pair of dorsal tubercles.

Antenna 1 shorter than body length, flagellum 13-segmented; antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached to middle of pereonite II, proximal part of palm with a palmar spine, poison tooth and triangular tooth small.

A male specimen 7.5 mm long (Fig. 92, H): Body smooth except pereonites V and VI, pereonite II longest of all segments, V a little shorter than II, III and IV subequal in length but a little shorter than V, VI and VII taken together a little longer than V, I a little shorter than head; pereonite V with two pairs of dorsal tubercles, pereonite VI with a pair of dorsal tubercles.

Antenna 1 shorter than body length, flagellum 13-segmented; gnathopod 2 attached rather to frontal part of pereonite II, palmar margin of propodus evenly convex and with a palmar spine.

A male specimen 3.7 mm long (Fig. 92, I): Pereonites II, III and IV subequal in length, V a little shorter than IV, VI and VII taken together a little shorter than V, I a little shorter than half of head; pereonites I, II, III and IV smooth, pereonite V with a pair of small tubercles on back, pereonite VI with a pair of small dorsal tubercles.

Antenna 1 a little longer than half of body length, flagellum 9-segmented; gnathopod 2 attached to middle part of pereonite II, poison tooth and triangular tooth of propodus not yet developed; gills oblong.

A larval specimen 1.4 mm long (Fig. 92, J): Pereonites II, III, IV and V subequal in length, VI a little shorter than V, VII a little shorter than VI, I a little shorter than half of head; head and body smooth.

Antenna 1 a little shorter than half of body length, flagellum 1-segmented; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to middle of pereonite II, propodus without either poison tooth and triangular tooth; gills oblong.

DISTRIBUTION.: Type localities: China; de Castries Bay, Sakhalin, 52° N. or Lemaire Strait; South America.

Other localities around Japan: Amur to China (Mayer, 1890: 80); Vladivostok (Mayer, 1903: 78); Nakabuta? (Mayer, 1903: 78); Asamushi (Utinomi, 1943: 281); Onagawa Bay, Miyagi Pref. (Utinomi, 1943: 271); Off Yoriiso to Matsushima (Utinomi, 1943: 271); Takenoura, Miyagi Pref. (Utinomi, 1943: 271); Ommae Bay, Miyagi Pref. (Utinomi, 1943: 271); Izushima, Miyagi Pref. (Utinomi, 1943: 272); Asamushi (Utinomi, 1947: 71); the Yellow Sea (collected by Keisuke Okada, 1968, Coll. no. 337); Abashiri (Arimoto, 1971: 13); Toyoura, Hokkaido (Arimoto, 1971: 13); Sunahara, Uchiura Bay, Hokkaido (Arimoto, 1971: 13); Off Date-cho,

Hokkaido (Arimoto, 1971: 13); Akkeshi Bay (Arimoto, 1971: 13); Off Wakkanai-shi (Arimoto, 1971: 13); Off Aomori-shi (Arimoto, 1971: 13); Mutsu Bay (Arimoto, 1971: 13); Off Kanida-cho, Aomori Pref. (Arimoto, 1971: 13); Hirota Bay, Iwate Pref. (Arimoto, 1971: 13); Ohfunado Bay, Iwate Pref. (Arimoto, 1971: 13); Kamaishi Bay (Arimoto, 1971: 13); Noda Bay, Iwate Pref. (Arimoto, 1971: 13); Off Takatashi, Iwate Pref. (Arimoto, 1971: 13); Kesennuma (Arimoto, 1971: 13); Aise, Ibaragi Pref. (Arimoto, 1971: 13); Ryozu, Sado Island (Ito, 1972: 26); Kugurizaka, Aomori Bay, *Zostera*-belt (Utinomi, 1973: 31); Fukaura, west coast of Aomori Pref. (Utinomi, 1973: 31).

Additional collection: Onagawa Bay (Utinomi, 1943: 272); Akkeshi Bay (Zen Nagao, 1967, Coll. no. 254; Utinomi, 1973: 31); Kesennuma Bay (Kesennuma

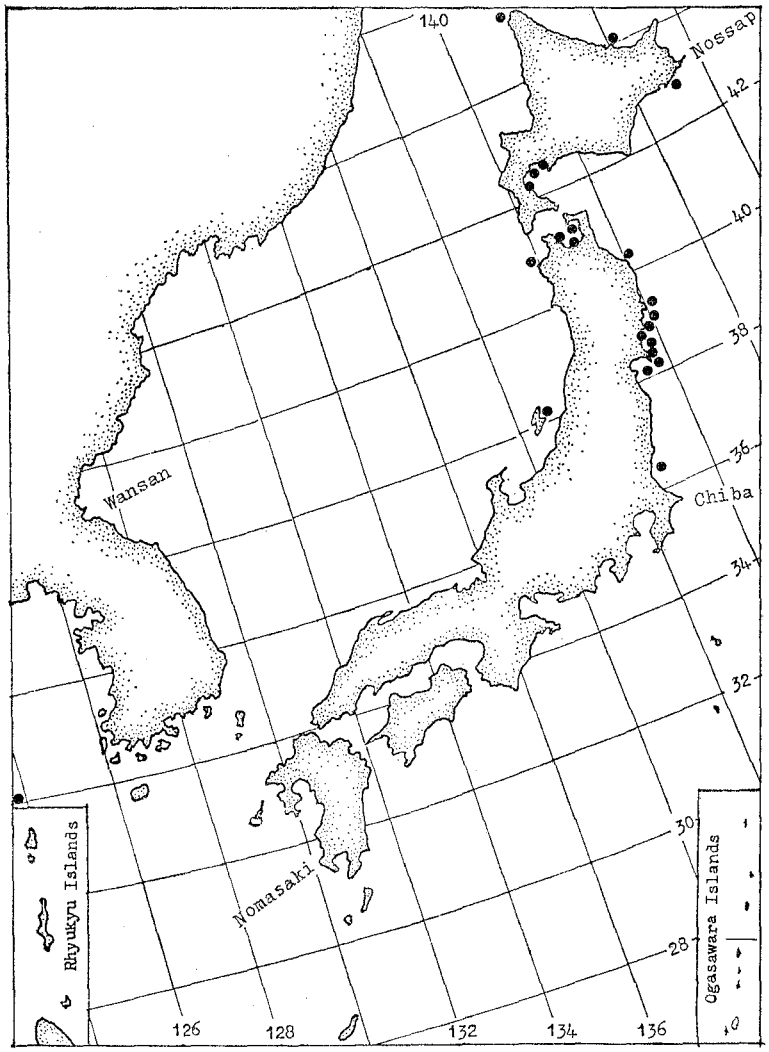

Fig. 93. Distribution records of *Caprella* (*Spinicephala*) *acanthogaster* Mayer around Japan.

branch of Miyagi Fisheries Experimental Station, 1968, Coll. no. 164); Off Aomori-shi (Arimoto, 1971: 13); Mutsu Bay (Arimoto, 1971: 13); Kanida-cho (Arimoto, 1971: 13); Ohfunado Bay (Arimoto, 1971: 13); Kesennuma Bay (Arimoto, 1971: 13).

57. *Caprella* (*Spinicephala*) *paulina* Mayer, 1903

(Jap. name: *Kobukabotya-warekara* Arimoto, 1971)

Fig. 94.

Caprella paulina Mayer, 1903, Siboga Exped. Mon., 34: 116–117, pl. 5 figs. 5–8. ——Utinomi, 1943, Journ. Fac. Sci. Hokkaido imp. Univ., (6) 8 (3): 295–296, fig. 9. ——Utinomi, 1947, Seibutsu (suppl), 1: 75. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 32. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 43. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 34.

No specimen in the author's collection.

OCCURRENCE: Akkeshi Bay, collected by M. Iwasa, Jul. 17, 1933, 1 female, (Utinomi, 1943: 295–296).

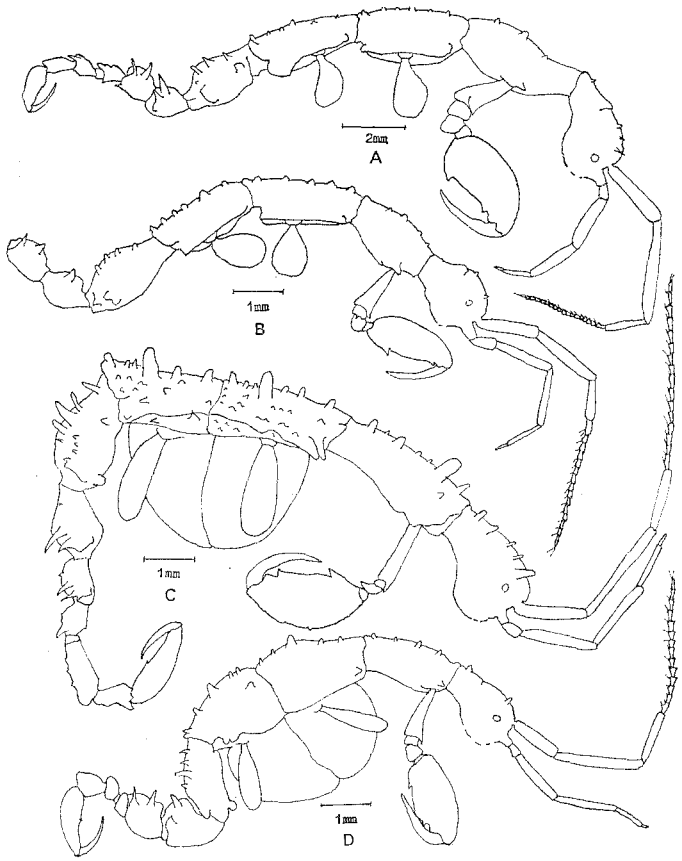

Fig. 94. *Caprella* (*Spinicephala*) *paulina* Mayer (after Mayer).
A, adult male; B, male; C, adult female; D, female.

DESCRIPTION: Reproduced from Mayer's and Utinomi's description (1903 and 1943). Male: Body length of adult specimen 17 mm (Fig. 94, A), long, robust and provided with paired tubercles of various sizes all over on back; pereonite II longest of all pereonites, pereonites III and IV subequal in length, and a little shorter than II, V shorter than IV, VI shorter than V, VII a little shorter than VI, I shorter than head; head with 1–3 pairs of small tubercles, pereonite I with 2 pairs of minute tubercles on back, pereonite II with 3 pairs of dorsal tubercles, pereonite III with 6 pairs of tubercles on back, and with a lateral projection in front and distal end each side, pereonite IV with 6 pairs of tubercles on back and with a lateral projection in front part and distal end of each side, pereonite V with 4 pairs of dorsal tubercles, pereonite VI and VII each with 2 pairs of tubercles on back, tubercles of pereonites V-VII rather acutely pointed.

Antenna 1 a little longer than half of body length, its flagellum a little shorter than half of peduncle and 17-segmented; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to middle of pereonite II, its segment 1 short, a little shorter than half of pereonite II, propodus a little shorter than pereonite II, and about twice as long as its greatest breadth, with a projection at palmar angle but no spine, poison tooth and triangular tooth small; gills oblong; propodus of pereopods with clasping spines submedially.

Female: Body length of adult specimen 16 mm (Fig. 94, C), robust and provided with many tubercles of various sizes all over on back; pereonite II longest of all pereonites, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, VI and VII taken together almost subequal to V, I shortest of all pereonites; head with 3 pairs of tubercles on back, pereonite II with 3 pairs of large dorsal tubercles and 4 pairs of small dorsal tubercles on back, and a small tubercle on fore part of lateral side, pereonite III with a pair of large dorsal tubercles, 6 pairs of small dorsal tubercles, and several lateral tubercles and a large spiky lateral tubercle on fore and hind ends of each side, pereonite IV with 4 pairs of large dorsal tubercles and a pair of small tubercles on back, and several tubercles on lateral side, pereonite V with 4 pairs of large dorsal tubercles, and a few of small lateral tubercles, pereonite VI and VII have each a pair of tubercles on back, these tubercles rather acute, and sharp projections placed just above attachment of pereopods 6 and 7.

Antenna 1 about as long as half of body length, flagellum a little longer than peduncle, and 16-segmented; antenna 2 a little shorter than peduncle of antenna 1; gnathopod 2 attached to near front end of pereonite II, propodus more than twice as long as its greatest breadth; gills elongate.

GROWTH: Male: A specimen of 12 mm in body length (Fig. 94, B); pereonite III longest of all segments, IV a little shorter than III, II and V subequal and a little shorter than V, VI and VII taken together as long as V, I shorter than head; flagellum of antenna 1, 16-segmented.

Female: A specimen of 12 mm in body length (Fig. 94, D); pereonite III longest of all segments, II and IV subequal in length and a little shorter than III, V a little shorter than IV; head with a pair of small tubercles on back, pereonite

II with 4 pairs of small dorsal tubercles, pereonite III and IV each with 5 pairs of small dorsal tubercles, pereonite V with 4 pairs of small dorsal tubercles; flagellum of antenna 1, 14-segmented.

DISTRIBUTION: Type locality: St. Paul Island, Alaska, 10.92 meters.

Other records: Iliuliuk, Captains Harbor, Unalaska, Adakh, Popoff Strait, and Kyska Harbor, Alaska; Kamchatka Peninsula (Mayer, 1903: 116); Bering Island and east coast, surface to 27.4 meters.

Other localities around Japan: Akkeshi Bay (Utinomi, 1943c: 295–296); Bentenjima, Nemuro (Utinomi, 1973: 34).

58. *Caprella (Spinicephala) polyacantha* Utinomi, 1947

(Jap. name: *Iga-warekara* Utinomi, 1969)

Figs. 95, 96.

Caprella polyacantha Utinomi, 1947, Seibutsu (suppl.), 1: 75–76, figs. 4–5. ——Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 203–206, figs. 7–8. ——Utinomi, 1969, Publ. Seto mar. biol. Lab., 16 (5): 302–304, fig. 5. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 36. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 43.

No specimen in the author's collection.

OCCURRENCE: Asamushi, collected by Matsudani, 2 males (Utinomi, 1947: 75); Yakatajima, Kamae Bay, Ohita Pref., July 19, 1965, 2 males (Utinomi, 1969: 302–304); Possjet Bay (Vassilenko, 1967: 203–206).

DESCRIPTION: Male: Reproduced from the original description by Utinomi (1947: 75). Body length of adult specimen 6 mm (Fig. 95, A); covered with many thorny spines on all body surface; pereonite IV longest of all segments, III a little shorter than VI, II a little shorter than III, V a little shorter than II, VI a little shorter than V, VII shorter than VI, I shorter than VII; head short, without point at fore end, but with two pairs of dorsal spines, pereonite I with a pair of dorsal spines, pereonite II with 3–4 centro-dorsal spines, 4 pairs of dorsal spines and several lateral spines, pereonite III with 3 dorsal spines, 5 pairs of dorsal spines and several lateral spines, pereonite IV with 3–4 dorsal spines, 4 pairs of dorsal spines and several lateral spines, pereonite V with 2 dorsal spines, 3 pairs of dorsal spines and few lateral spines, pereonites VI and VII each with 2 pairs of dorsal spines and a few lateral spines.

Antenna 1 approximately shorter than half of body length, flagellum 7- or 8-segmented, each bearing a few setae distally; antenna 2 slightly longer than peduncle of antenna 1, segment 1 of flagellum long and setose ventrally.

Inner lobe of maxilliped with feathered spines planted on distal margin, outer lobe about as long as inner lobe and with 3 denticulations at inner margin together with several long spines; gnathopod 2 attached to near fore end of pereonite II, its segment 1 about as long as half of pereonite II, propodus a little shorter than twice of segment 1, and a little shorter than twice of its greatest breadth, which has setiferous poison tooth, palmar angle bearing a spine submedially close to poison

tooth and slightly projecting, distal angle of palm triangularly projecting, and separated by wide median concavity from poison tooth, and with 3 small spines; gills oblong; pereopods 5–7 (Fig. 96, H), hind margins of segments 1, 3 and 4 denticulate in outline, propodus quadrangular and tapered distally, with a pair of grasping spines proximally, dactylus shorter than propodus.

Abdomen (Fig. 96, G) has a pair of abdominal appendages and a pair of lobes.

Female: Reproduced from the description by Vassilenko (1967: 203). Body length of adult specimen 5.5 mm (Fig. 96, I); pereonite III the longest of all segments, IV a little shorter than III, II a little shorter than IV, V a little shorter than II, VI and VII taken together a little longer than V, I very short; thorny spines all over the body surface like in male; propodus of gnathopod 2 a little shorter than its segment 1, and a little shorter than twice that of its greatest breadth, with projecting setiferous palmar spine and sub-palmar spines, slightly convex palmar margin, and with a few small spines, propodus tapering distally.

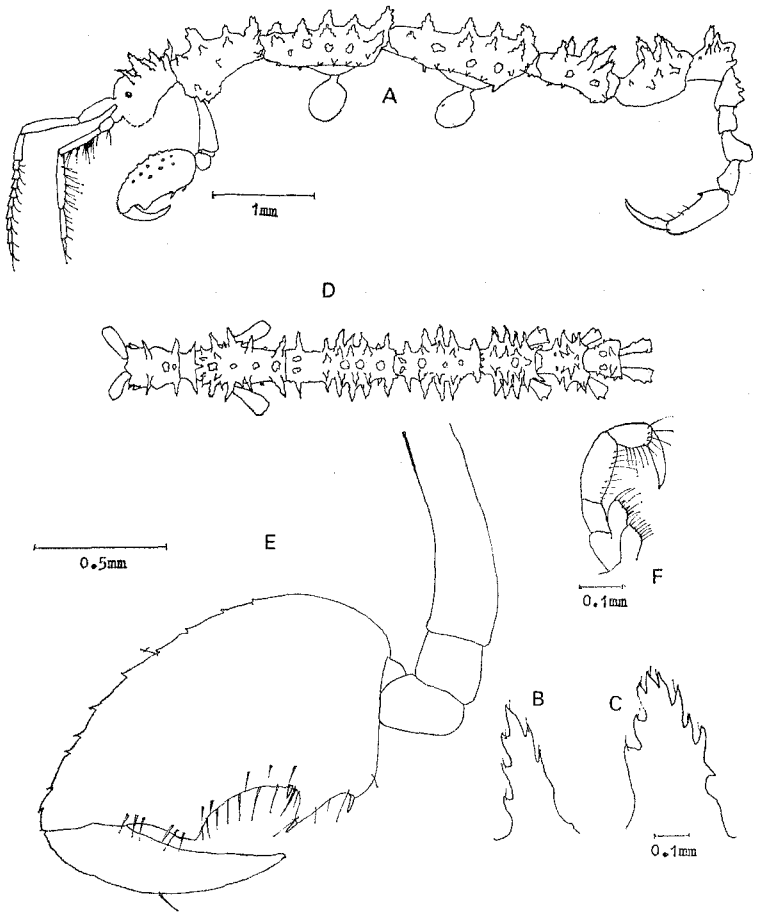

Fig. 95. *Caprella* (*Spinicephala*) *polyacantha* Utinomi (after Utinomi).
A, adult male; B, thorny-spines of lateral side of the body; C, thorny-spines of dorsal side of the body; D, dorsal view of male; E, gnathopod 2 of adult male; F, maxilliped.

DISTRIBUTION: Type locality: Asamushi (Utinomi, 1947: 75–76).

Other localities around Japan: Possjet Bay (Vassilenko, 1967: 203–206, 4.2–5.5 meters); Sunohama, Yakatashima, Kamae Bay (Utinomi, 1969: 302–303).

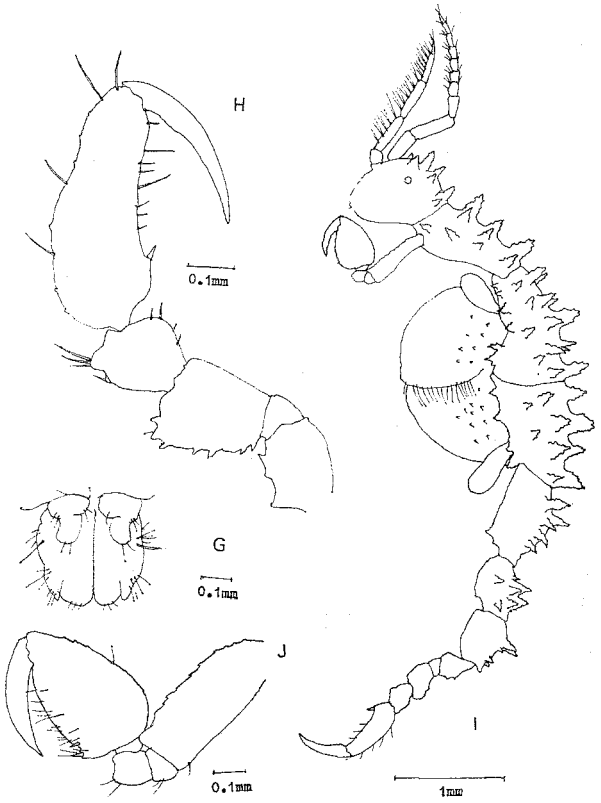

Fig. 96. *Caprella* (*Spinicephala*) *polyacantha* Utinomi (after Utinomi).
G, abdomen of male; H, pereopod 5 of male; I, adult female; J, gnathopod 2 of female.

C) Subgenus *Rostrhicephala*, n. subgen.

With a forward spine projected from the dorsal front of head.

TYPE SPECIES: *Caprella* (*Rostrhicephala*) *penantis* Leach.

The following species, all belonging to subgen. *Rostrhicephala*, are collected in the world, but never around Japanese waters.

dilatata Kroyer, *laevipes* Mayer, *incisa* Mayer, *circur* Mayer, *fretensis* Stebbing, *liparotensis* Haller, *falsa* Mayer, *gorgonia* Laubitz, *tenuis* Haswell, *vana* Mayer.

59. *Caprella* (*Rostrhicephala*) *drepanochir* Mayer, 1890

(Jap. name: *Togeasi-warekara* Utinomi, 1969)

Fig. 97.

Caprella drepanochir Mayer, 1890, Fauna Flora Golf. Neapel, 17: 81–82, pl. 7 figs. 15, 33, 34. ——

Mayer, 1903, Siboga Exped. Mon., 34: 100, pl. 4 fig. 11. ——Shoemaker, 1920, Rep. Canadian Arct. Exped., 7: 23. ——Utinomi, 1943, Journ. Fac. Sci. Hokkaido imp. Univ., (6) 8 (3): 289–291, figs. 5–6. ——Utinomi, 1947, Seibutsu (suppl.), 1: 73–74. ——Hirosaki, 1964, Misc. Rep. Res. Inst. Nat. Resources, 62: 68. ——Utinomi, 1969, Publ. Seto mar. biol. Lab., 16 (5): 300–302, fig. 4. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 18. ——Laubitz, 1970, Nat. Mus. Natur. Sci. Pub. Bio. Ocean., 1: 53, fig. 16. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 15.

OCCURRENCE: Akkeshi Bay, collected by Zen Nagao, Oct. 1, 1966, attached to *Tublaria* (Hydrozoa), 1 male, Coll. no. 255 (fig. 95, A), (Arimoto, 1971: 15); Akkeshi Bay, collected by Zen Nagao, Jul. 26, 1967, attached to Hydrozoa, 2 males, Coll. no. 253 (fig. 95, B), (Arimoto, 1971: 15); Akkeshi Bay, collected by Akkeshi High School of Fish., Sep. 16, 1968, 7 males, Coll. no. 326, (Arimoto, 1971: 15).

DESCRIPTION: Male: Body length of adult specimen 13 mm (Fig. 97, A), moderately plump, devoid of dorsal tubercles, but whole surface of body and gnathopods 2 covered with sensory hairs; pereonite II longest of all segments, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, VI and VII taken together a little longer than V, I about as long as head; head angularly projected in front; pereonites II, III and IV each with a ventro-lateral tooth situated

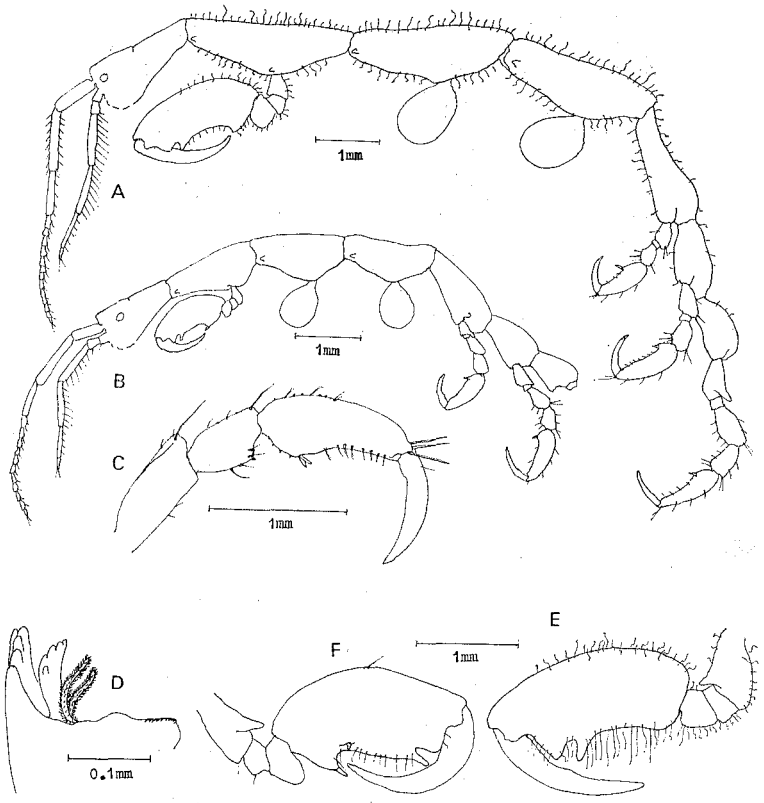

Fig. 97. *Caprella* (*Rostrhicephala*) *derpanochir* Mayer.
A, adult male (material from Akkeshi Bay, Hokkaido, Coll. no. 255); B, young male (ditto, Coll. no. 253); C, a part of pereopod 7; D, mandible; E, gnathopod 2 of adult male; F, gnathopod 2 of young male.

at fore end on each side.

Antenna 1 nearly one-third as long as body length, its flagellum 13-segmented; antenna 2 a little longer than peduncle of antenna 1; lacinia mobilis of right mandible denticulate with 5 teeth and having a molar; gnathopod 2 attached a little behind the middle of pereonite II, its segment 1 very short and broadend distally, projecting forward at its distal end, propodus very large, width less than half of length, palmar surface without palmar spine, but large distal poison tooth separated by cleft from more distal triangular projection, whole surface except dactylus covered with sensory hairs; gills round; pereopods 5 to 7 show slight increase in length posteriorly, hind margin of propodus armed with 3–4 small teeth, and clasping spines proximally.

Abdomen, typical of genus.

Young male: Body length 9 mm (Fig. 97, B); head and body smooth except pereonites II, III and IV; pereonites II-V subequal in length, VI and VII taken together a little longer than V, I a little longer than head; pereonites II, III and IV each with a small ventrolateral process at fore end on side.

Antenna 1 a little shorter than half of body length, its flagellum 11-segmented; antenna 2 a little longer than peduncle of antenna 1; gnathopod 2 attached a little behind middle of pereonite II, its segment 1 about twice as long as broad, propodus oblong and twice as long as its width, fore and hind margins evenly convex, palmar angle bearing a strong proximal spine and subpalmar-spines, poison tooth sharp, long and distally located, distal angle triangularly projecting, palmar margin rectilinear with a few small spines.

DISTRIBUTION: Type locality: "Reise von China nach der Amurmundung" (McCain, 1970: 18).

Other records: Bering Island, 14.56 meters; Port Clarence, Alaska.

Other localities around Japan: China (Mayer, 1890: 81); Vladivostok (Mayer, 1903: 100); Akkeshi, 1 meter (Utinomi, 1943: 289); Sagami Bay (Y. Hirosaki, 1964: 68); Kamae Bay (Utinomi, 1969: 300).

Additional collection: Akkeshi Bay (Zen Nagao, 1966, Coll. no. 255, and 1966. Coll. no. 253); Akkeshi Bay (Akkeshi High School of Fisheries, 1966, Coll. no. 326).

60. *Caprella* (*Rostrhicephala*) *algaceus* Vassilenko, 1967

(Jap. name: *Umino-warekara* Arimoto, 1971)

Fig. 98.

Caprella algaceus Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 218–221, figs. 16–18. —— McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 12. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 13.

No specimen in the author's collection.

OCCURRENCE: Possjet Bay, attached to *Sargassum*, June 28, 1962 (Vassilenko, 1967: 218–221).

DESCRIPTION: Reproduced from the original description by Vassilenko (1967:

218–221).

Male: Length of specimen in Vassilenko's figure 10 mm, body smooth and slender; pereonites II and III subequal in length, pereonite IV a little shorter than III, V a little shorter than IV, pereonite VI half as long as V, VII a little shorter than VI, I a little shorter than VII; head rather angularly projecting in front.

Antenna 1 slightly shorter than half of body length, flagellum 11-segmented; antenna 2 about as long as peduncle of antenna 1, segment 3 of peduncle with long spinules at 6 or 7 points, segment 4 with spinules at 8 or 9 points, segment 1 of flagellum with short spinules at 5 points on inner margin; gnathopod 2 attached rather to front part of pereonite II, segment 1 a little shorter than propodus, propodus a

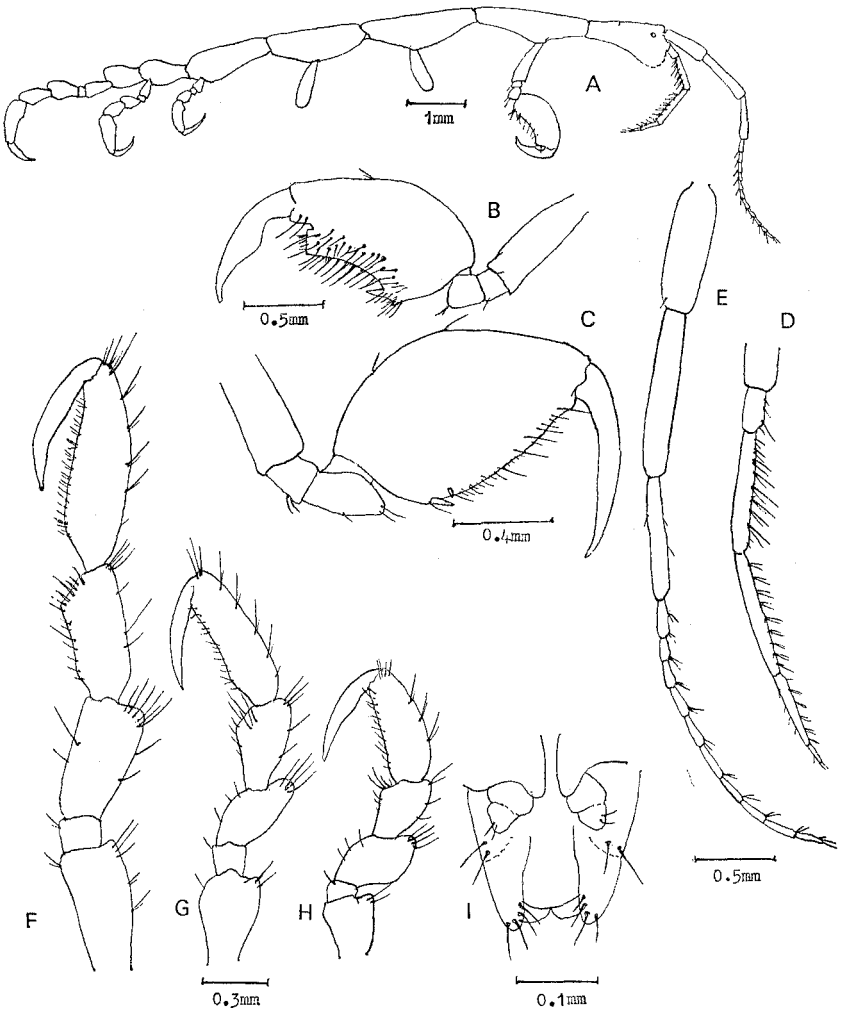

Fig. 98. *Caprella* (*Rostrhicephala*) *algaceus* Vassilenko (after Vassilenko).
A, adult male: B, propodus of gnathopod 2 of male; C, propodus of gnathopod 2 of female; D, antenna 2; E, antenna 1; F, pereopod 7; G, pereopod 6; H, pereopod 5; I, abdomen of male.

little shorter than twice of its greatest breadth, a grasping palmar spine at base of palm, a large triangular tooth at distal angle of palm, palmar margin fringed with long spines; pereopod 5 a little longer than pereonite V, its segment 4 with several spines on inner, outer margins and apex, propodus larger than segment 4, many delicate spines on palmar margin, and without palmar spines, outer margin with slender spine groups at 4 or 5 points; pereopods 6 longer than 5, pereopod 7 longest, its segment 4 subequal to 3 in length, with several spines on inner margin and apex, outer margin with slender spine groups at 4 points, propodus longest, palmar margin with many delicate spines, outer margin with slender spine groups at 5 or 6 points; gills elongate.

Abdomen, penes short and medial, with a pair of appendages and a pair of lobes.

Female: Propodus of gnathopods 2 smaller than male's and palmar margin slightly convex, tapering proximally and distally, with palmar spine and subpalmar spines proximally and many spines at palmar margin.

DISTRIBUTION: Type locality: Possjet Bay, Japan Sea (Vassilenko, 1967: 218–221).

61. *Caprella (Rostrhicephala) danilevskii* Czerniavski, 1868

(Jap. name: *Hoso-warekara* Utinomi, 1969)

Fig. 99, 100, 101.

Caprella Danilevskii Czerniavski, 1868, Trudy Sezd Russykh St. Pétersbourg, 1868: 92–93, pl. 6 figs. 21–34. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 54. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 58–60, pl. 5 fig. 44, pl. 7 figs. 12–13, 54. ——Mayer, 1903, Siboga Exped. Mon., 34: 99. ——Tichy, 1911, Bull. Acad. Sci. St. Pétersbourg, (6) 16: 1131, 1133, 1134. ——Zernov, 1913, Mém. Acad. Sci. St. Pétersbourg, (8) 32 (1): 68. ——Arimoto, 1930, Journ. Tokyo nat. Hist. Soc., 28 (39): 50–51, fig. 5. ——S. Cărăusu, 1956, An. Stiint. Univ. Iasi., (n. ser.) (2) (Biol.) 2 (1): 131, 132.

Caprella Danilewskii Sovinski, 1880, Zapiski Kiev. Obshch., 6 (1): 88, 100–101. ——d' A.W. Thompson, 1901, Catal. Crust. Mus. Dundee: 41. ——Sovinski, 1904, Mém. Soc. Nat. Kiew, 18: 96. ——Chevreux and Fage, 1925, Faune France, 9: 454–455, fig. 432. ——Ruffo, 1941, Boll. Ist. Ent. Univ. Bologna, 11: 125. ——Ruffo, 1946, Boll. Soc. Ent. Italiana, 76 (7–8): 53.

Caprella Danilevkii Monterosso, 1915, Atti Accad. Gioen. Sci. nat. Catania, (5) 8: 15–16.

Caprella danilevskii Stebbing, 1888, Rep. Voy. Challenger, (Zool.) 29 (67): 1264–1267, pl. 145. ——Stebbing, 1910, Mem. Austr. Mus., 4 (12): 653. ——Kunkel, 1910, Trans. Connecticut Acad. Arts. Sci., 16: 110–111. ——Zernov, 1913, Mém. Acad. Sci. St. Pétersbourg, (8) 32 (1): 233. ——Barnard, 1916, Ann. South African Mus., 15 (3): 280–281. ——Mayer, 1920, in Michaelsen, Beitr. Kenntn. Meeresf. Westafrikas, 3: 14. ——Hale, 1929, Crust. South Australia: 232–233, fig. 228. ——Barnard, 1937, Sci. Rep. John Murray Exped., 4 (6): 134, 197. ——Hiro (=Utinomi), 1937, Annot. Zool. Japon., 16 (4): 312–313, pl. 22 fig. 6. ——Utinomi, 1943, Sci. Rep. Tōhoku imp. Univ., (Biol.) (4) 17 (3): 275. ——Utinomi, 1943, Sci. Rep. Tōhoku imp. Univ., (Biol.) (4) 17 (3): 284, fig. 4. ——Utinomi, 1943, Journ. Fac. Sci. Hokkaido Univ., (6) 8 (3): 289. ——Utinomi, 1947, Seibutsu (suppl.), 1: 73. ——Edmondson and Mansfield, 1948, Occ. Pap. Bishop Mus. Honolulu, 19 (10): 216–218, fig. 8. ——Stschapova, Mokyevsky and Pasternak, 1957, Trudy Akad. Nauk USSR, 23: 87. ——A. Cărăusu and S. Cărăusu, 1959, Trav. Sta. zool. Agigea, 1956: 384–385. ——Mokyevsky, 1960, Trudy Inst. Okeanol. Akad. Nauk USSR, 34: 255, 261. ——Hirosaki, 1964, Misc. Rep. Inst. Nat. Res., 62: 68. ——Sando, 1964, Bull. Mar. Biol. Sta. Asamushi, 12 (1): 31. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14, pl. 1 fig. 6. ——Kikuchi, 1966, Publ.

Amakusa mar. biol. Lab., 1 (1): tab. 21. ——Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 221–223, fig. 19. ——McCain, 1968, Bull. United States Nat. Mus., 278: 22–25, figs. 10–11, 55. ——Utinomi, 1969, Publ. Seto mar. biol. Lab., 16 (5): 299. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 16. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 15. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 32.

Caprella danilewskii S. Cărăusu and A. Cărăusu, 1942, Ann. Sci. Nat. Univ. Jassy, 18: 82, fig. 8d. ——Irie, 1958, Bull. Fac. Fish. Nagasaki Univ., 7: 87, 89, 90, 91. ——Irie, 1959, Bull. Fac. Fish. Nagasaki Univ., 8: tab. 4, fig. 4. ——S. Costa, 1960, Trav. Sta. Zool. Villefranche-sur-Mer, 19 (19): 99, 100.

Caprella danileaskii Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: pl. 3 fig. 8.

Caprella denilewiskii Kikuchi, 1966, Publ. Amakusa mar. biol. Lab., 1 (1): tab. 21.

?*Caprella Helleri* Haller, 1879, Zool. Anz., 2 (27): 232. ——Haller, 1880, Zeitschr. wiss. Zool., 33: 406–407, pl. 23 fig. 43. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 54. ——Carus, 1885, Piodr. Faunae Mediterr., 1: 389. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 58. Type locality: "Bei Scilla, Messina, Lipári", Sicily, Italy.

Caprella inermis (not Grube, 1864) Haswell, 1880, Proc. Linn. Soc. New South Wales, 4: 348, pl. 23 fig. 3. ——Haswell, 1882, Catal. Australian Crust.: 314. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 71, figs. 26–29. ——Haswell, 1885, Proc. Linn. Soc. New South Wales, 9: 1000. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 75. ——Oliveira, 1940, Mem. Inst. Oswaldo Cruz., 35 (1): 139. ——Guiler, 1954, Ann. Mag. nat. Hist., (12) 7 (79): 532–533, fig. 1. Type locality "Port Jackson", Sydney, New South Wales, Australia.

OCCURRENCE: Tateyama Bay, collected by Arimoto, May 4, 1927, Coll. no. 8; Coll. no. 10; Aug. 21, 1828, attached to *Sargassum*, Coll. no. 35; 2 males, Coll. no. 38; 5 males, 3 females, Coll. no. 73; Apr. 28, 1929, 4 males, 1 female, Coll. no. 76; Tomioka, Kanagawa Pref., collected by Arimoto, Apr. 28, 1929, 4 males, attached to *Sargassum*, Coll. no. 76; Akkeshi Bay, collected by Zen Nagao, Aug. 6, 1967, many males and females, attached to Hydrozoa, Coll. no. 250; Akkeshi Fish. High School, Sep. 16, 1968, 1 male, Coll. no. 323; Ajigasawa, collected by Kunio Takahashi, Mar. 25, 1968, 1 male, attached to rope for farming *Undaria*, depth 15 maters, Coll. no. 165; Toyoma, Fukushima Pref., collected by Tenjin and Arimoto, Aug. 9, 1968, many males and females, Coll. no. 321; Ohshima Island, collected by Yōzo Kurata, Aug. 1, 1968, 11 males, 2 females, depth 80 meters, Coll. no. 328; Aio, Yamaguchi Pref., collected by Yamaguchi Inland Fish. Exp. St., Jun. 15, 1968, 8 males, 2 females, Coll. no. 312; Off Nagato-shi, Yamaguchi Pref., collected by Shinji Shigemune, Apr. 8, 1968, 1 male, attached to rope for farming *Undaria*, Coll. no. 175; Yotsukura, Fukushima Pref., collected by Yoichi Yuzawa, Jun. 5, 1969, 4 males, attached to *Sargassum*, Coll. no. 343; Aikawa, Niigata Pref., collected by Yamamoto, Ishimi and Arimoto, May 4, 1970, 6 males, 1 female, by dredging, Coll. no. 486; Futami, Sado Island, collected by Kitami, Ishimi and Arimoto, May 3, 1970, 11 males, 17 females, attached to *Sargassum*, Coll. no. 631; Himezu, Sado Island, collected by Kitami, Yamamoto and Arimoto, May 2, 1970, 11 males, 2 females, attached to *Sargassum*, Coll. no. 610, 3 females, Coll. no. 607; Ohsu, Sado Island, collected by Kitami, Ishimi, Yamamoto and Arimoto, May 3, 1970, 34 males, 25 females, attached to *Sargassum*, Coll. no. 622; Front of Sado Mar. biol. Lab., collected by Arimoto, May 4, 1970, 21 males, 50 females, attached to *Sargassum*,

Coll. no. 418, 78 males, 70 females, Coll. no. 391; Senkaku Ikkei, Sado Island, collected by Kitami, Ishimi and Arimoto, May 2, 1970, 14 males, 10 females, attached to *Sargassum*, Coll. no. 496; 16 males, 2 females, Coll. no. 601; Senkaku Sankei, Sado Island, collected by Kitami, Ishimi, and Arimoto, May 2, 1970, 10 males, 9 females, attached to *Sargassum*, Coll. no. 481; Tassha Bay, Sado Island, collected by Kitami, Yamamoto and Arimoto, May 2, 1970, 14 males, 6 females, attached to *Sargassum*, Coll. no. 404, depth 1 meter, 1 male, Coll. no. 421, depth 10 meters, 2 males, Coll. no. 490; Toyoda, Sado Island, collected by Kitami, Ishimi, Yamamoto and Arimoto, May 3, 1970, 4 males, 4 females, attached to *Sargassum*, Coll. no. 614; 10 males, 10 females, Coll. no. 617; Oki Island, 9.5 meters depth, 4 males, J.I. Bruce coll., Coll. no. 652(4).

DESCRIPTION: Male: Body length of adult 12 mm (Text-fig. 99, A), smooth and elongate; pereonite II longer than other pereonites, III and VI subequal in length and a little shorter than II, V a little shorter than IV, VI and VII taken together a little shorter than V; head smoothly rounded above but angularly projecting in front, pereonite I shorter than head.

Antenna 1 a little longer than one-third of body length, flagellum 14-segmented; antenna 2 a little longer than peduncle of antenna 1, having setules, flagellum 2-segmented.

Incisor of mandible strongly projecting, and divided into 5 teeth apically, lacinia mobilis rather elongated, apically divided into 4 teeth, setal row containing 3 on left mandible, 2 on right mandible, molar tubercle strong, prominent; inner lobe of maxilla 1 not developed, outer lobe having 5 strongly denticulate spines and some cilium on truncate distal margin, segment 1 of palp not so long as broad, segment 2 long and broad with its apical margin carrying 6 spine-teeth, also numerous setiform spines on surfaces, some of which are considerably long; inner lobe of maxilla 2 shorter than outer, with slender spines fringing slightly rounded apex and descending to inner margin for a short distance, and mixed with 1 or 2 feathered setae, outer lobe having distal margin still more squated, faintly crenelate, and fringed with rather stronger and longer spines, outer margin with spinules and some cilia; inner lobes of maxilliped reaching a little beyond base of segment 1 of palp, narrow at base, widening apically with broad distal margin, having 2 distant spine-teeth and several feathered spines, outer border, not reaching apex of segment 1 of palp, small, inner margin faintly serrate, fringed with slender setiform feathered spines, 3 strong spine-teeth at apex, segment 1 of palp broad, and a little longer than wide, segment 2 twice as long as 1, inner margin fringed with slender spines, many of which very long; segment 3 much narrower than 2, with fringes of long spines on either inner margin and apex, segment 4 rather longer than 1, inner margin finely pectinate, its nail short but extremely sharp.

Gnathopod 2 attached rather to rear of the middle of pereonite II, segment 1 a little shorter than one-third of propodus in length, propodus, quite characteristic in shape, long, large, three-times as long as broad, narrowing basaly, palmar spine small and situated on front part, triangular tooth distally, convex between triangular

tooth and palmar spine, with small ciliums; pereopod 5 subequal to pereonite V, segment 3 longer than 1, segment 2 short and narrow, 4 shorter than 3, 5 longest, lacking palmar spine on palmar margin, but with several setae, outer margin has groups of slender spines at 3 or 4 points, pereopods 5 and 6 like 7 in shape, but increasing in length from 5 to 7.

Gills, elongate, sausage-shaped and usually bent forward.

Female: Body of adult 8.2 mm (Text-fig. 100, F); pereonites II, III and IV subequal in length, pereonite V shorter than IV, VI a little shorter than V, VII a little shorter than VI, I a little shorter than VII; flagellum of antenna 1, 10-segmented; propodus of gnathopod 2 very small and differs in shape from that in male.

GROWTH: Male: Young specimen 7.3 mm long (Text-fig. 99, B); pereonites

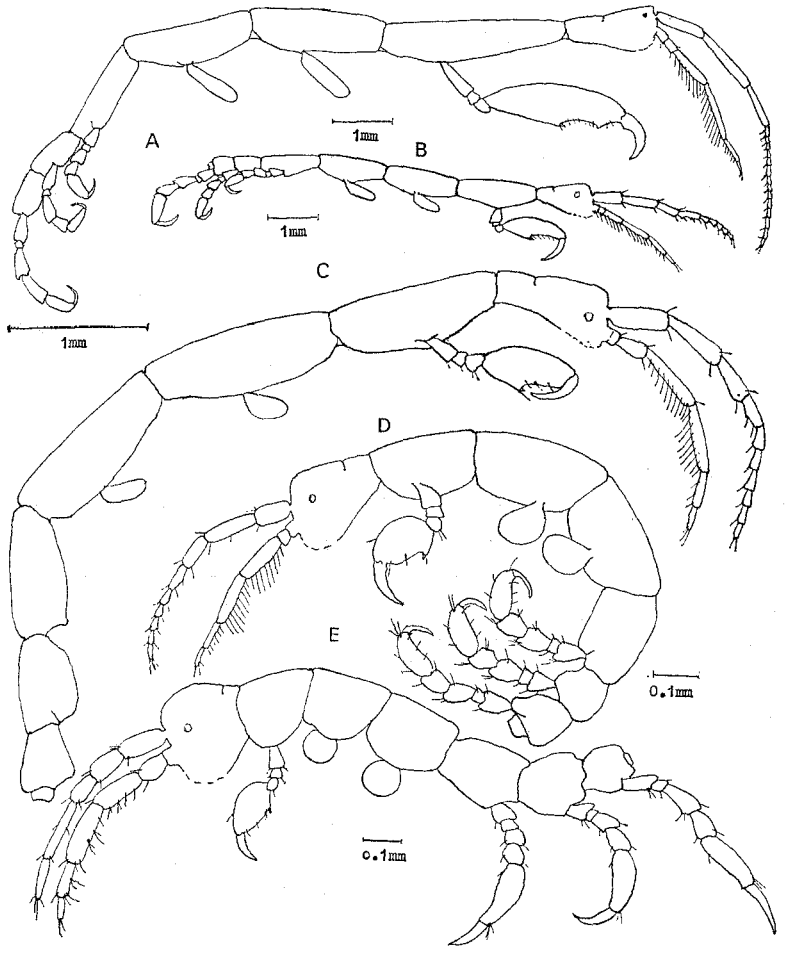

Fig. 99. *Caprella* (*Rostrhicephla*) *danilevskii* Czerniavski.
A, adult male (Arimoto, 1930); B, young male (material from Tassha Bay, Sado Island, Coll. no. 391); C, young male (material from Tassha Bay, Sado Island, Coll. no. 404); D, larva male (material from Tassha Bay, Sado Island, Coll. no. 391); E, larva hatched out (ditto).

II, III and IV subequal in length, V a little shorter than IV, VI a little shorter than V, VII a little shorter than VI, I a little shorter than VII; flagellum of antenna 1, 6-segmented; basal segment of gnathopod 2 very short and attached rather above middle of pereonite II, propodus small but like that of adult in shape, and palmar spine situated on middle part of palmar margin.

A larva specimen 1.5 mm long (Text-fig. 99, D); pereonites II and V subequal in length, III and IV subequal and a little longer than II, VI and VII subequal and shorter than V; flagellum of antenna 1, 6-segmented; propodus of gnathopod

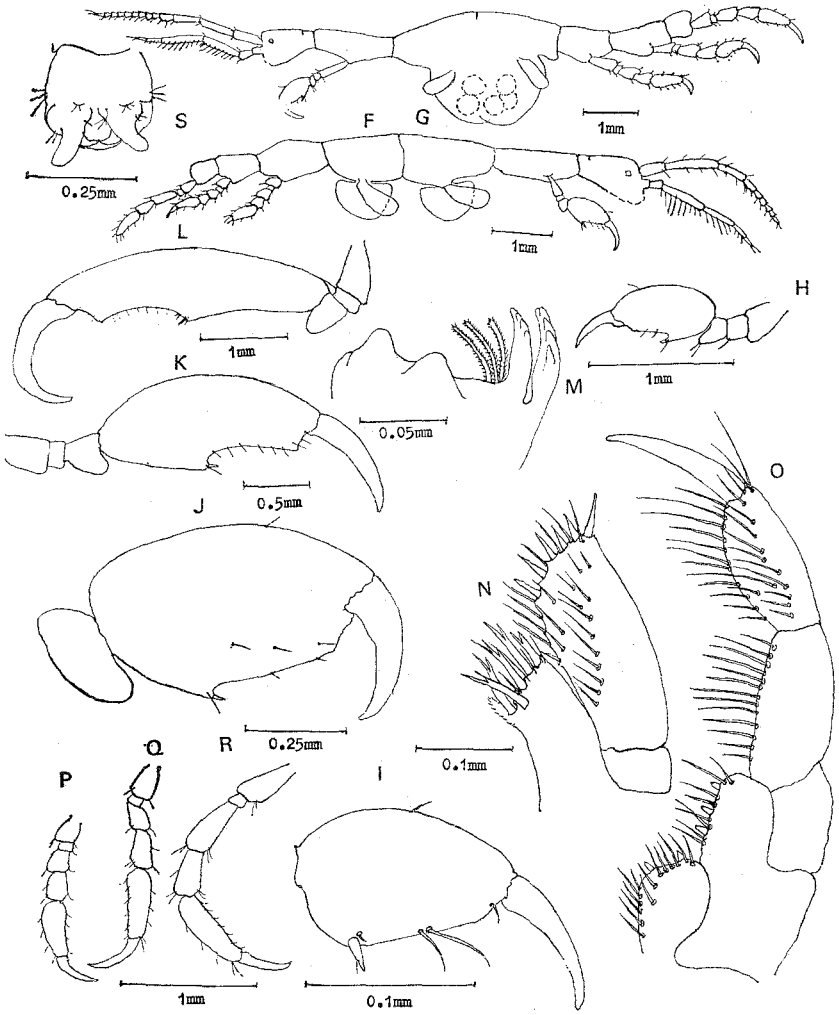

Fig. 100. *Caprella* (*Rostrhicephala*) *danilevskii* Czerniavski.
F, Adult female (material from Tassha Bay, Coll. no. 391); G, young female (ditt); H, gnathopod 2 of adult female; I, propodus of gnathopod 2 of hatched out male; J, propodus of gnathopod 2 of larva of male; K, propodus of gnathopod 2 of male; L, propodus of gnathopod 2 of adult male; M, mandible; N, maxilla 1; O, maxilliped; P, pereopod 5; Q, pereopod 6; R, pereopod 7; S, abdomen of male.

2 short, oblong and with strongly convex outer margin, palm evenly curved with proximal projection; pereopods 5 and 6 subequal in length but 7 a little longer than 6.

A hatch-out larva 1.3 mm long (Text-fig. 99, E): Pereonites II, III, IV and V subequal in length, VI a little shorter than V, VII a little shorter than VI, I shortest; head rounded above; flagellum of antenna 1, 2-segmented, antenna 1 and 2 subequal in length, with setae; propodus of gnathopod 2 small and oval, propodus of pereopods 5, 6 and 7 normal, palmar margin slightly concave, and with a few setae, no palmar spine; gills rounded.

Female: A young specimen 7.5 mm long (Text-fig. 100, G); pereonites II,

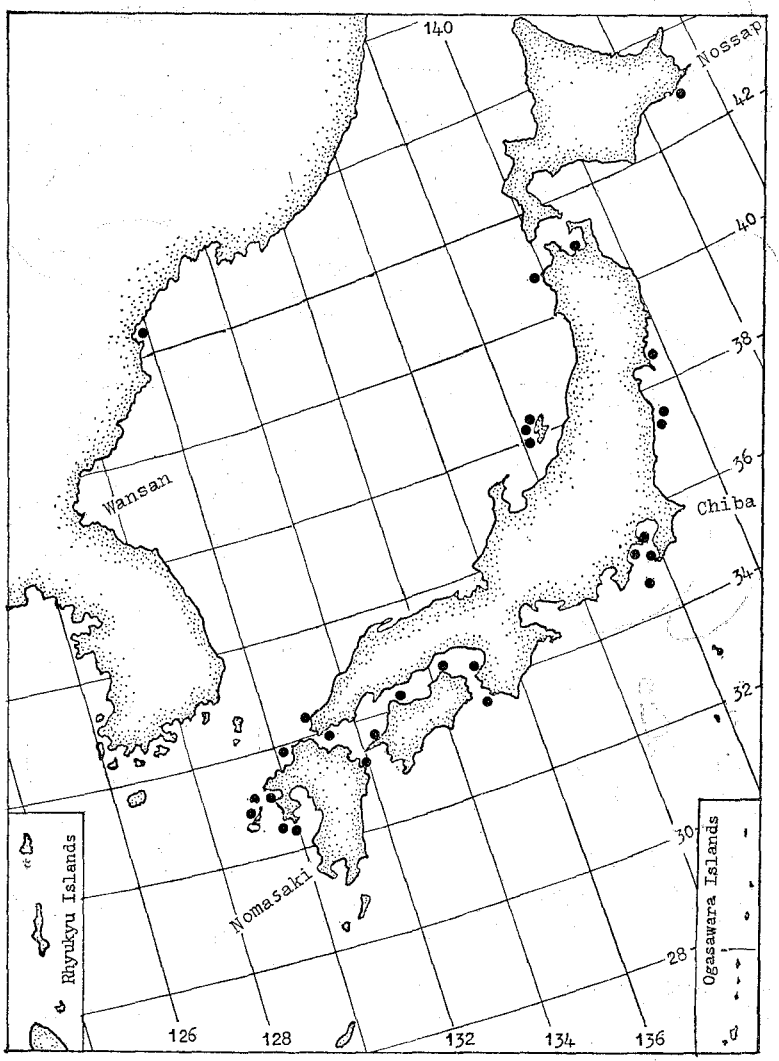

Fig. 101. Distribution records of *Caprella* (*Rostrhicephala*) *danilevskii* Czerniavski around Japan.

III and IV subequal in length, V a little shorter than IV, VI a little shorter than V, VII a little shorter than VI, I a little shorter than VII; flagellum of antenna 1, 6-segmented, antenna 1 and 2 subequal in length; gnathopod 2 small and short, propodus oval; gills elongate; oostegite oval and not yet forming marsupium.

DISTRIBUTION: Type locality: Black Sea.

Other records: Bay of Biscay; Mediterreanen coast of France; Mediterranen and Adriatic coasts of Italy; Sicily; Ukranian and Roumanian Black Sea; Cherchell, Algeria; Rufisque, Senegal; Southwest Africa; South Africa; South Arabian coast; Bermuda; Virginia Key, Key Biscayne, and Matheson Hammock, Florida; Loggerhead Key, Tortugas; St. Croix, Virgin Islands; Trinidad; Rio de Janeiro, Brazil; Oahu, Hawaii; South Sakhalin.

Localities around Japan: Korean Straits (Mayer, 1890: 58); Sakhalin (Mayer, 1903: 99); Tateyama Bay (Arimoto, 1930: 18); Tanabe Bay (Hiro=Utinomi, 1937: 318); Akkeshi Bay (Utinomi, 1943: 289); Asamushi (Utinomi, 1943: 284); Onagawa Bay (Utinomi, 1943: 275); Okinoshima, Fukuoka Pref. (Utinomi, 1947: 73); Tomioka, Kumamoto Pref. (Utinomi, 1947: 73); Goto Islands (Irie, 1957: 3); Ohmura Bay (Irie, 1958: 107); Sasebo (Irie, 1958: 91); Sagami Bay (Hirosaki, 1964: 68); Possjet Bay (Vassilenko, 1967: 221); Kamae Bay (Utinomi, 1969: 299); Tassha Bay (Arimoto, 1970, Coll. nos. 391, 404, 421, 470); Senkaku Sankei, Sado Island (Arimoto, 1970, Coll. no. 418); Aikawa Bay (Arimoto, 1970, Coll. no. 486); Senkaku Ikkei, Sado Island (Arimoto, 1970, Coll. nos. 496, 601); Obama, Sado Island (Arimoto, 1970, Coll. nos. 607, 610); Toyoda, Sado Island (Arimoto, 1970, Coll. nos. 614, 617); Ohsu, Sado Island (Arimoto, 1970, Coll. no. 622); Himezu, Sado Island (Arimoto, 1970, Coll. no. 624); Off Futami, Sado Island (Arimoto, 1970, Coll. no. 631); Toyoma, Fukushima Pref. (Arimoto, 1971: 15); Ohshima, Tokyo (Arimoto, 1971: 15); Tomioka, Kanagawa Pref. (Arimoto, 1971: 15); Aio, Yamaguchi Pref. (Arimoto, 1971: 15); Nagasaki beach, Ozaki, Sennan, Osaka Bay (Utinomi, 1973: 32); Nagahama, Ehime Pref. (Utinomi, 1973: 32); Kurushima Strait, Seto Inland Sea (Utinomi, 1973: 32).

Additional collection: Tateyama Bay (Arimoto, 1927, Coll. no. 108, 1928, Coll. nos. 35, 38, 73, 88); Akkeshi Bay (Zen Nagao, 1967, Coll. no. 250, Akkeshi Fish. High School, 1968, Coll. no. 323); Senzaki, Yamaguchi Pref. (Arimoto, 1971: 15).

62. *Caprella* (*Rostrhicephala*) *tsugarensis* Utinomi, 1947

(Jap. name: *Tsugaru-warekara* Utinomi, 1971)

Figs. 102, 103.

Caprella tsugarensis Utinomi, 1947, Seibutsu (suppl.), 1: 78–79, fig. 8. ——Vassilenko, 1967, Explor. Fauna Sea USSR, 5 (13): 214–216, figs. 13–14. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 43. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 46. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 36.

OCCURRENCE: Akkeshi Bay, collected by Zen Nagao, Sep. 5, 1967, 3 males, 1 female, Coll. no. 252; Kominato Bay, collected by Arimoto, Aug. 25, 1967, attached

to *Sargassum* 1 male, 1 female, Coll. no. 136 (Arimoto, 1971: 46); Ishibe, off Shizuoka-shi, collected by Yaizu Fish. High School, May 25, 1968, 1 male, Coll. no. 195 (Arimoto, 1971: 46).

DESCRIPTION: Male: Body length of specimen 9.3 mm (Text-fig. 102, A), smooth and slender; pereonites II, III and IV subequal in length, pereonite V half as long as II, VI a little shorter than V, VII a little shorter than VI, I about half of head length; without ventral and dorsal spines.

Antenna 1 a little shorter than half of body length, flagellum 11-segmented; antenna 2 longer than peduncle of antenna 1, with swimming setae, segment 1 of flagellum with several setae.

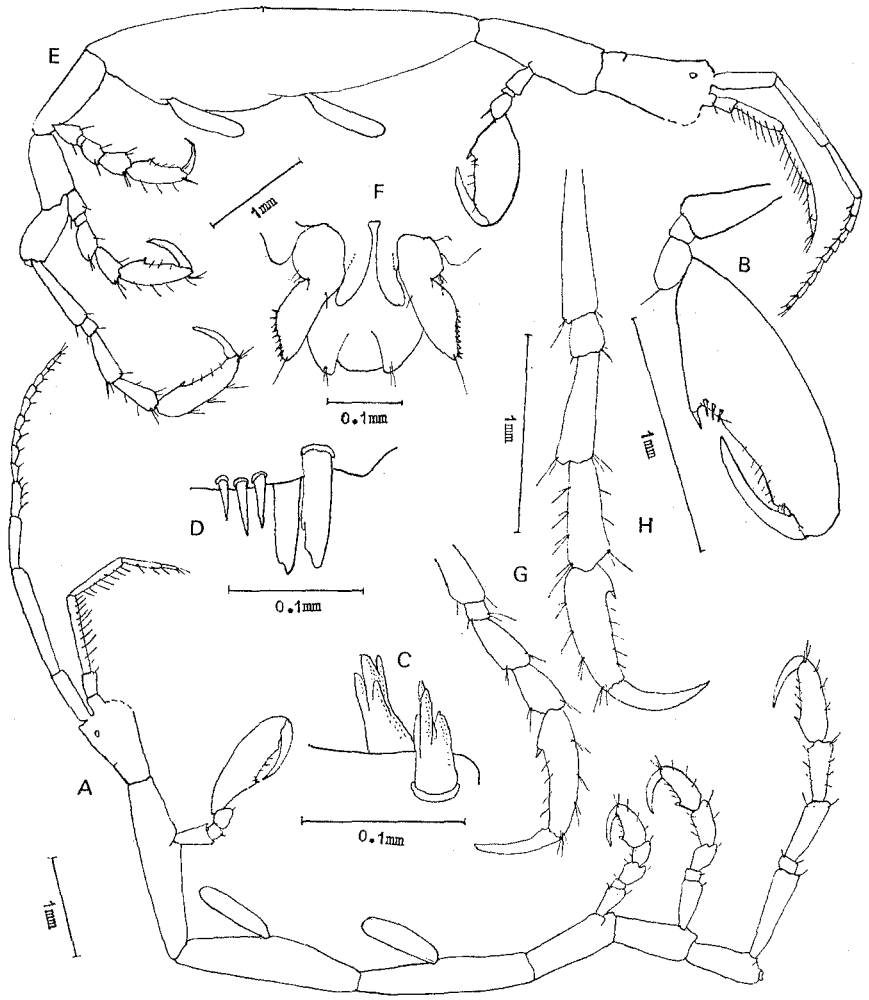

Fig. 102. *Caprella (Rostrhicephala) tsugarensis* Utinomi.
A, adult male (material from Ishibe, Coll. no. 195); B, gnathopod 2 of adult male; C, palmar spines of propodus of pereopod 7; D, palmar spines of propodus of gnathopod 2 of adult male; E, female (material from Kominato, Coll. no. 136); F, abdomen of male; G, pereopod 5; H, pereopod 7.

Gnathpod 2 attached rather to the middle of pereonite II, segment 1 short and about one-fifths of pereonite II in length, propodus three-times as long as segment 1, and three-times as long as its greatest breadth, tapering proximally and distally, there is one pair of grasping palmar spines and three small pairs of subpalmar spines at median of palm, distal angle of palm with triangular tooth, palm evenly curved; pereopod 5 smaller than pereopod 6, segment 1 widening distally from a narrow neck, segment 3 nearly as long as 1, with some selender spines near distal margin, segment 4 as long as 3, but narrower, several spines on inner and outer margins, propodus with a pair of dentate spines proximally on palmar margin, these spines divided into 4 distally; pereopod 6 longer than 5, pereopod 7 longest and about twice the length of 5, segment 4 as long as 3 but narrower, spines at 3 points of inner

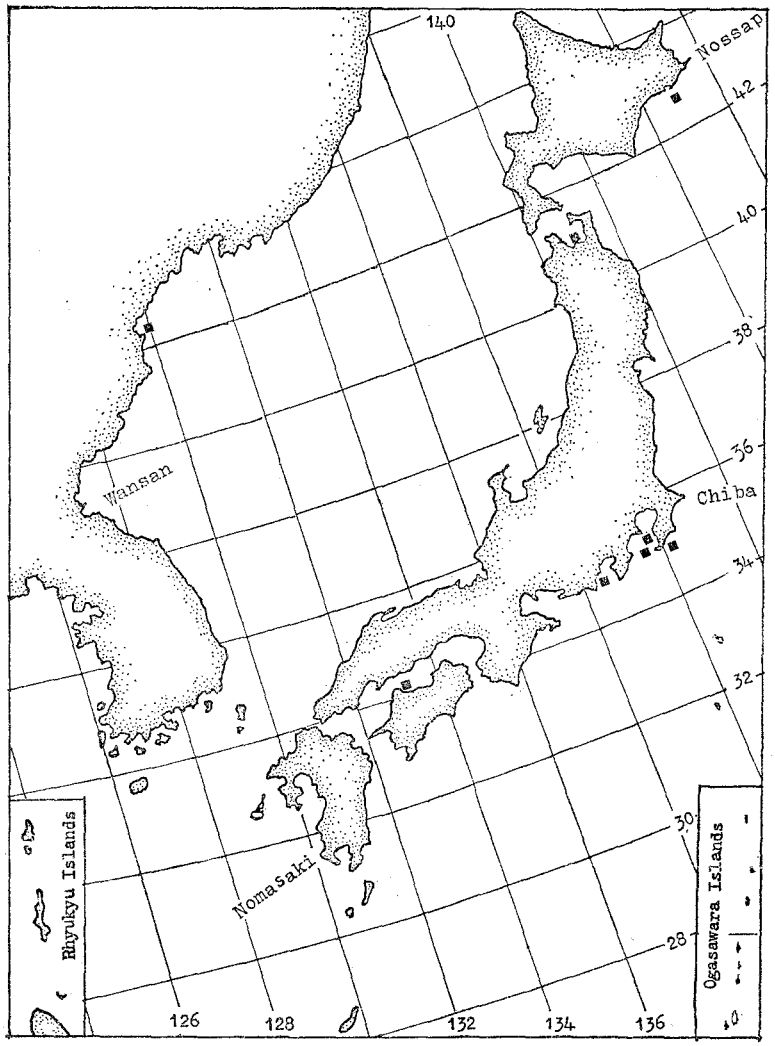

Fig. 103. Distribution records of *Caprella* (*Rostrhicephala*) *tsugarensis* Utinomi around Japan.

margin, and at 4 points of outer margin, segment 5 subequal in length to 4, with a pair of dentate spines proximally and several small spines on the palmar margin, outer margin with groups of slender spines at 4 points.

Gills, on pereonites III and IV, elongate.

Abdomen, penes long, at medial point, a pair of appendages with a slender spine apically and serrated teeth apically and on outer margin.

Female: Body length of adult 8.5 mm (Text-fig. 102, E), smooth and elongate; pereonite I very much shorter than that of male, head slightly projecting in front; flagellum of antenna 1, 8-segmented; gnathopod 2 attached near front part of pereonite II, propodus a little shorter than three-times of its breadth; abdomen a pair of lobes.

DISTRIBUTION: Type locality: Asamushi, Mutsu Bay.

Other localities around Japan: Possjet Bay (Vassilenko, 1967: 214); Akkeshi Bay (Arimoto, 1971: 46; Utinomi, 1973: 36); Asamushi (Utinomi, 1974: 78–79); Kominato, Chiba Pref. (Arimoto, 1971: 46); Off Yaizu, Shizuoka Pref. (Arimoto, 1971: 46); Mosaki, Kamegisyo, east of Sagami Bay, BLIH-Crust. (Utinomi, 1973: 36); Near Sashima, east of Sagami Bay, BLIH-Crust. (Utinomi, 1973: 36); Kurushima Strait, Ehime Pref. (Utinomi, 1973: 36).

63. *Caprella (Rostrhicephala) subinermis* Mayer, 1890

(Jap. name: *Kaginote-warekara* Utinomi, 1964)

Figs. 104, 105.

Caprella subinermis Mayer, 1890, Fauna Flora Golf. Neapel, 17: 85–86, pl. 5 fig. 45, pl. 7 figs. 18, 44. ——Mayer, 1903, Siboga Exped. Mon., 34: 126. ——Arimoto, 1931, Journ. Tokyo nat. Hist. Soc., 29 (41): 18–19, pl. 3 fig. 7. ——Utinomi, 1947, Seibutsu (suppl.), 1: 78. ——Hirosaki, 1964, Misc. Rep. Res. Inst. Nat. Resources, 62: 68. ——Utinomi, 1964, in Kikuchi, Fauna Sea Amakusa mar. biol. Lab., 5: 15, pl. 1 fig. 4. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 42. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 46. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 36.

Caprella fretensis (not Stebbing, 1878), Hiro (=Utinomi), 1937, Annot. Zool. Japon., 16 (4): 313–314, fig. 2, pl. 22 fig. 8. ——Irie, 1959, Bull. Fac. Fish. Nagasaki Univ., 8: tab. 4.

OCCURRENCE: Tateyama Bay, collected by Arimoto, Aug. 21, 1928, 23 males, attached to rope of set nets, Coll. no. 54, Aug. 22, 1928, 4 females, attached to *Sargassum*, Coll. no. 69; Otomi Bay, Fukui Pref., collected by Tohru Yasuda, Apr. 30, 1968, 1 male, depth 5 meters, Coll. no. 268.

DESCRIPTION: Male: Body length of adult specimen 14.3 mm (Fig. 104, A), smooth and slender; pereonite II longer than other segments, pereonite III shorter than II, IV a little shorter than III, I a little shorter than IV, V a little shorter than I, VI a little shorter than V, VII shorter than VI; head slightly angularly projecting in front; eye small.

Antenna 1 a little shorter than half of body length, flagellum 11-segmented; antenna 2 a little shorter than peduncle of antenna 1, slightly setose, segment 1 of flagellum with 6 pointed spinules on inner margin; gnathopod 2, characteristic in

shape, lies rather to rear of pereonite II, segment 1 very short and about equal in length to the greatest breadth of propodus, propodus very long, about equal to pereonite II, its basal part very narrow, one pair of palmar spines on front part of palm, and a triangular tooth at distal angle of palm; pereopod 5 shorter than 6, segment 1 widening distally from a narrow neck, a little shorter than twice its breadth, segment 4 a little shorter than 3, with 4 pointed spines on inner margin, propodus longer than segment 1, with a pair of dentate crowns divided into three-toothed spines proximally on palmar margin, delicate setae on inner margin of palm, while outer margin provided with groups of slender spines at 5 points; pereopod 6 longer than 5, 7 longest.

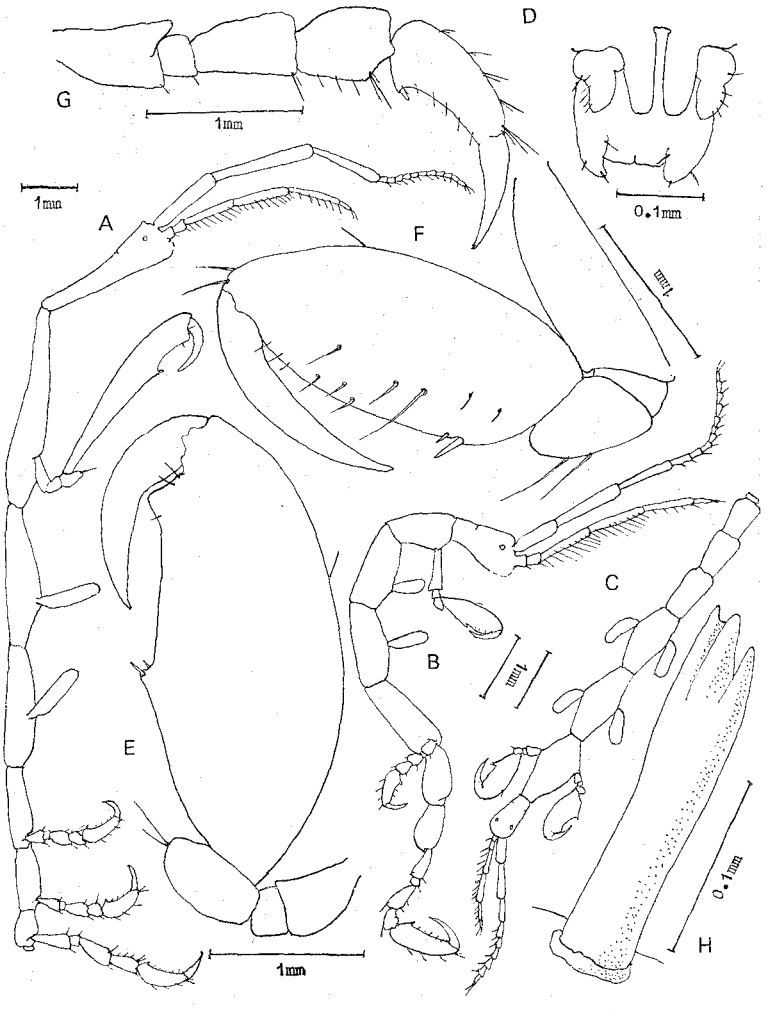

Fig. 104. *Caprella* (*Rostrhicephala*) *subinermis* Mayer.
A, adult male (Arimoto, 1931); B, young male (material of Coll no. 268); C, dorsal view of young male (material of Coll. no. 54); D, abdomen of male; E, gnathopod 2 of young male; F, gnathopod 2 of youngest male; G, pereopod 5; H, palmar spine of pereopod 5.

Gills elongate.

Abdomen, penes located at medial part, long.

GROWTH: Young male: A specimen from Otomi Bay, 7 mm long (Text-fig. 104, B); pereonites II, III, IV and V subequal in length, pereonite VI shorter than V, VII shorter than VI, I shortest; antenna 1 with 11-segmented flagellum; antenna 2 longer than peduncle of antenna 1; gnathopod 2 attached near front part of pereonite II, propodus more than twice as long as its greatest breadth, one pair of grasping palmar spines and a subspine at median point of palm, and a triangular tooth at distal angle of palm.

A specimen from Tateyama Bay, 6.5 mm long (Text-fig. 104, C): Flagellum of antenna 1, 6-segmented; gnathopod 2 attached to middle part of pereonite II, pro-

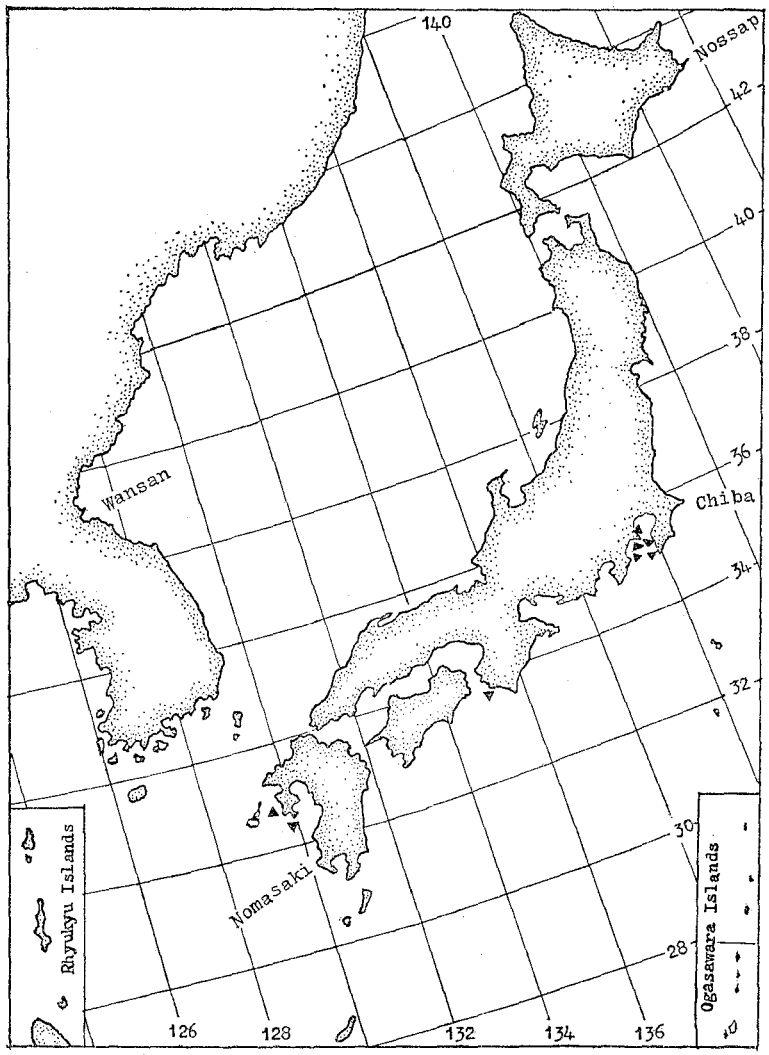

Fig. 105. Distribution records of *Caprella* (*Rostrhicephala*) *subinermis* Mayer around Japan.

podus more or less oblong, palmar spine and subpalmar spine proximally, palmar margin convex with several setae.

DISTRIBUTION: Type locality: Kadsiyama (=Katsuyama, entrance to Tokyo Bay, Mayer 1890: 35).

Other localities around Japan: Ohmori, Tokyo (Mayer, 1890: 85); Tateyama Bay (Mayer, 1903: 126); Nagasaki (Mayer, 1903: 126); Tateyama Bay (Arimoto, 1931: 18); Tanabe Bay (Utinomi, 1937: 313); Tomioka, Amakusa Island (Kikuchi, 1962: 29); Tomioka (Utinomi and Kikuchi, 1964: 15); Sagami Bay, on drift algae (Hirosaki, 1964: 68); Zyōgashima, east of Sgami Bay, BLIH-Crust. (Utinomi, 1973: 36).

64. *Caprella (Rostrhicephala) equilibra* Say, 1818

(Jap. name: *Kubinaga-warekara* Utinomi, 1964)

Figs. 106, 107, 108, 109.

Caprella equilibra Say, 1818, Journ. Acad. nat. Sci. Philadelphia, 1: 391–392. ——De Kay, 1844, Zoology New-York, 6: 41. ——White, 1847, List Crust. British Mus.: 92. ——Gibbes, 1848, in Tuomey, Report Geol. South Carolina, app.: 16. ——Gibbes, 1849, in White, Statistics State Georgia: 23. ——Stebbing, 1888, Rep. Voy. Challenger, (Zool.) 29 (67): 1254–1256. ——Stebbing, 1910, Ann. South African Mus., 6 (4): 466. ——Stebbing, 1910, Mem. Australian Mus., 4 (12): 653. ——Kunkel, 1910, Trans. Connecticut Acad. Arts Sci., 16: 106–108, fig. 4. ——Barnard, 1916, Ann. South African Mus., 15 (3): 281. ——Schellenberg, 1928, Trans. Zool. Soc. London, 22: 678. ——Barnard, 1930, Nat. Hist. Rep. British Antarct. Exped., (Zool.) 8 (4): 440. ——Barnard, 1932, Discovery Rep., 5: 300. ——(?) Procter, 1933, Biol. Survey Mt. Desert Region, 5: 256. ——Edmondson and Mansfield, 1948, Oce. Pap. Bishop Mus. Honolulu, 19 (10): 214–216, fig. 7. ——Ricketts and Calvin, 1952, Between Pacific Tides, (ed. 3): 68. ——Dougherty and Steinberg, 1953, Proc. biol. Soc. Washington, 66: 44, 47. ——Dougherty and Steinberg, 1954, in Light et al., Intertidal Invert. Centr. Calif. Coast: 170, 171. ——Day and Morgan, 1956, Ann. Natal Mus., 13 (3): 303. ——Steinberg and Dougherty, 1957, Tulane Stud. Zool., 5 (11): 272–274, figs. 1–2. ——Johnson, R.G., 1965, Progr. Rep. Atomic Energy Comm., app. 2: 2. app. 3: 4. ——McCain, 1965, Chesapeake Sci., 6 (3): 193–194, fig. 1b, f. ——Johnson and Juskevice, 1965, Res. Rep. Pacific mar. Sta., 5: 39. ——Johnson, R.G., 1966, Progr. Rep. Atomic Energy Comm., app. 2: 2. ——McCain, 1966, Galathea Rep., 8: 92. ——McCain, 1968, Bull. United States Nat. Mus., 278: 25–30, figs. 12–13, 55. ——Pequegnat and Pequegnat, 1968, Res. Rep. Texas Univ., (Oceanogr.) (286–6): 24, 33–34, 53–54, 60–62, 67, figs. 4–5. ——Ricketts, Calvin and Hedgpeth, 1968, Between Pacific Tides, (ed. 4): 102, 491. ——McCain, 1969, New Zealand Journ. Mar. Freshw. Res., 3 (2): 287–288, fig. 1. ——Keith, 1969, Crustaceana, 16 (2): 119–124. ——Krapp-Schickel, 1969, Zool. Jb. Syst., 96: 284, 349. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 19. ——Laubitz, 1970, Pub. biol. Ocean., 1: 55–58, fig. 17. map. fig. 6. ——McCain, 1971, Biol. Antarctic Sea, 17 (4): 113–114, fig. 3. ——Arimoto, 1971, Res. Crust., 4–5: (1–8) figs. 1–4. ——Arimoto, 1971, Ann. Rep. Sado mar. biol. St. Niigata Univ., 1: 30–35, figs. 1–4. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 15–16. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 33.

Caprella aequilibra Bate, 1862, Catal. Amphip. Crust. British Mus.: 362–363, pl. 57 fig. 5. ——Bate and Westwood, 1868, Hist. British Crust., 2: 71–73, fig. 1. ——Parfitt, 1873, Rep. Trans. Devonshire Ass. Adv. Sci., 6 (1): 251. ——Bate, 1878, in Couch, Journ. Roy. Inst. Cornwall, 19: 510. ——Gamroth, 1878, Zeitschr. wiss. Zool., 31: 101–126, pls. 8–10. ——Haller, 1879, Zool. Anz., 2 (27): 232. ——Haller, 1880, Zeitschr. wiss. Zool., 33: 404. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 45–48, pl. 1 fig. 7, pl. 2 figs. 1–11, pl. 4 figs. 20–25, pl. 5 figs. 16–18. ——Marion, 1883, Ann. Mus. Hist. nat. Marseille, (Zool.) 1 (1): 49. ——Miers, 1884, Rep. zool. Collect. Alert: 320. ——Haswell, 1885, Proc. Linn. Soc. New South Wales, 9: 999, 1000. ——Carus, 1885, Prodr. Faunae Mediterr., 1: 388. ——Thomson

and Chilton, 1886, Trans. Proc. New Zealand Inst., 18: 142. ——De Guerne, 1886, Bull. Soc. zool. France, 2: XLIII. ——Norman, 1886, Museum Normanianum, (ed. 1) 3: 17. ——Chevreux, 1887, Bull. Soc. zool. France, 12: 355. ——Bate, 1888, in Heape, Journ. mar. biol. Ass. United Kingdom, 1 (2): 175. ——Barrois, 1888, Catal. Crust. Açores: 58, 77. ——Chevreux, 1888, Bull. Soc. Étud. Sci. Paris, 1888: 2, 4–5, 9. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 48–50, pl. 2 figs. 42–43, pl. 4 figs. 35–37, pl. 6 fig. 37. ——Gourret, 1891, Ann. Mus. Hist. nat. Marseille, (Zool.) 4 (1): 4. ——Sars, G.O., 1895, Account Crust. Norway, 1: 663–664, pl. 238 fig. 3. ——Chevreux, 1899, C.R. Assoc. Franc. Av. Sci., 27 (2): 483. ——Chevreux, 1900, Rés. Camp, Sci. Monaco, 16: 120. ——Car, 1901, Glasnik Hrvatsk. Naravoslov. Drustva, 12 (2): 74. ——Thompson, d' A.W., 1901, Catal. Crust. Mus. Dundee: 41. ——Graeffe, 1902, Arb. zool. Inst. Univ. Wien, 13: 51 (19). ——Mayer, 1903, Siboga Exped. Mon., 34: 89–92, pl. 3 figs. 29–34, pl. 7 figs. 66–69. ——Hutton, 1904, Index Faun. Novae Zealandiae: 261. ——Mar. Biol. Assoc., 1904, Journ. mar. biol. Ass. United Kingdom, (n. ser.) 7 (2): 242. ——Norman, 1905, Mus. Nornanianum, (ed. 2) 3: 26. ——Norman, 1905, Ann. Mag. nat. Hist., (7) 16: 85. ——Norman and Scott, 1906, Crust. Devon Cornwall: 9, 99. ——Scott, 1906, Proc. Roy. Phys. Soc. Edinburgh, 16 (4): 175. ——Sinel, 1907, Rep. Trans. Guernsey Soc. Nat. Sci., 5: 222. ——Tiehy, 1911, Bull. Acad. Sci. St. Pétersbourg, (6) 16: 1134. ——Mayer, 1912, in Michaelsen and Hartmeyer, Fauna. Südwest-Austr., 4 (1): 4, 5. ——Thomson, 1913, Trans. Proc. New Zealand Inst., 45: 245. ——LaFollette, 1914, Journ. Ent. Zool. Pomona Coll., 6 (4): 224–225: pl. 5. ——Briggs, 1914, Pap. Proc. Roy. Soc. Tasmania, 1914: 79–80. ——Kunkel, 1918, Bull. Connecticut State Geol. nat. Hist. Surv., 26 (1): 180–181. ——Mayer, 1920, in Michaelsen, Beitr. Kennt. Meeresf. Westafrikas, 3: 14. ——Thomson and Anderton, 1921, Bull. Board Sci. New Zealand, 2: 113. ——Galdiano, 1924, Bol. Soc. Exp. Hist. nat., 24 (8): 392. ——Chevreux and Fage, 1925, Faune France, 9: 455–456, fig. 433. ——Schellenberg, 1926, Deutsche Südpolar-Exped., 18 (Zool. 10): 470. ——Johnson and Snook, 1927, Seashore Anim. Pacific Coast: 280–281, fig. 235. ——Stephensen, 1927, Vidensk. Medd. Dansk. Naturh. Foren., 84: 150. ——Stephensen, 1927, Vidensk. Medd. Dansk. Naturh. Foren., 83: 355, 385. ——Stephensen, 1928, Danmarks Fauna, 32: 386, fig. 92 (13). ——Stephensen, 1929, Tierwelt Nord-Ostsee, 10 (f): 180–181, figs. 43–336. ——Stephensen, 1929, Zoology Faroes, 23: 34. ——Mar. Biol. Assoc., 1931, Plymouth mar. Fauna: 198. ——Fischetti, 1932, Bull. Mus. Lab. Zool. Anat. comp. Genova, 12 (57): 1–28, figs. 1–5. ——Oldevig, 1933, Göteborgs Vetensk. Samh. Handl., (B) 3 (4): 269, fig. 3. ——MacGinitie, 1935, Amer. Midl. Nat., 16 (5): 701. ——Pirlot, 1939, Mém. Mus. Hist. nat. Belgique, (2) 15: 78. ——Fiorencis, 1940, Thalassia, 4 (6): 13–14, figs. 3–4, pl. 1 figs. 3, 4, 7. ——Milne, A., 1940, Journ. mar. biol. Ass. United Kingdom, 24 (1): 72. ——De Oliveira, 1940, Mem. Inst. Oswaldo Cruz, 35 (1): 139. ——Bertrand, 1941, Bull. Lab. mar. Dinard, 23: 12–26. ——Stephensen, 1942, Tromsö Mus. Skr., 3 (4): 439, 502, 503. ——McDougall, 1943, Ecol. Monogr., 13 (3): 363, 370. ——Hewatt, 1946, Ecol. Monogr., 16 (3): 296, 199, 201, 204. ——Ruffo, 1946, Boll. Soc. ent. Italiana, 76 (7–8): 53. ——Utinomi, 1947, Seibutsu (suppl.), 1: 72. ——Ellis, 1950, Contr. Bears Bluff. Lab., 8: 13. ——Reid, 1951, Atlantide Rep., 2: 283, 289. ——Guiler, 1952, Rec. Queen Victoria Mus., 3 (3): 31. ——Tuzet and Sanchez, 1952, Arch. Zool. exp. gén., 89 (1): 26–36, figs. 1–1 and 2, figs. 2, 3. ——Duke Univ. Mar. Lab., 1953, Check List marine Invert. Beaufort, (ed. 2): 22. ——Guiler, 1954, Ann. Mag. nat. Hist., (12) 7 (79): 532. ——Mar. Biol. Assoc., 1957, Plymouth Mar. Fauna, (ed. 3): 233. ——Belleudy, 1958, C.R. Soc. biol. Paris, 152 (2): 355–356. ——Irie, 1958, Bull. Fac. Fish. Nagasaki Univ., 7: 87, 90–91. ——Irie, 1959, Bull. Fac. Fish. Nagasaki Univ., 8: tab. 4. ——Costa, S., 1960, Trav. Sta. zool. Villefranchesur-Mer, 19 (19): 99, 100. ——Luther and Fiedler, 1961, Unterwasserfauna Mittelmeerküsten: 158, pl. 24. ——Hirosaki, 1964, Misc. Rep. Inst. Nat. Resources, 62: 68. ——Peyrot and Trilles, 1964, Bull. Inst. Océanogr. Monaco, 63 (1315): 1–28, figs. 1–19. ——Sandō, 1964, Bull. Mar. Biol. Sta. Asamushi, 12 (1): 31. ——Utinomi, 1964, In Kikuchi, Fauna Flora Sea Amakusa mar. biol. Lab., 5: 14.

Caprella Aequilibra Chevreux, 1888, C.R. Assoc. Franc. Av. Sci., 16 (2): 351.

Caprella caudata Thomson, 1879, Trans. Proc. New Zealand Inst., 11: 246, pl. 10 fig. D-5. —— Mayer, 1882, Fauna Flora Golf. Neapel, 6: 71–72. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 76. Type locality: "Dunedin", South Island, New Zealand.

Caprella Esmarkii Boeck, 1861, Forh. Skand. Naturf. Köbenhavn, 8: 674–675. ——Boeck, 1871, Forh. Vidensk. Selsk. Christiania, 1871: 275 (195). ——Boeck, 1876, Skandinaviske Amphipoder:

693–694, pl. 32 fig. 5. Type locality: Beian, Trondheimsfjord, Norway.

Caprella gigas Costa, A., 1867, Ann. Mus. zool. Univ. Napoli, 1864: 45. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 54. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 58. Type locality: "Golfo di Napoli", Italy.

Caprella Januarii Kröyer, 1843, Naturhist. Tidsskr., 4 (6): 499–504, pl. 6 figs. 14–20. ——Dana, 1853, United States Explor. Exped., 14 (2): 819–820. ——Dana, 1855, United States Explor. Exped., 13/14 (atlas): pl. 55 fig. 2. ——Herklots, 1861, Tijdschr. Entomol., 4: 43. Type locality: Rio de Janeiro, Brazil.

Caprella laticornis Boeck, 1861, Forh. Skand. Naturf. Köbenhavn, 8: 675–676. ——Boeck, 1871, Forh. Vidensk. Selsk. Christiania, 1871: 274 (194). ——Boeck, 1876, Skandinaviske Amphipoder: 689–691, pl. 32 fig. 10. Type locality: Beian, Trondheimsfjord, Norway.

Caprella linearis (not Linnaeus, 1767) Barrois, 1888, Catal. Crust. Açores: 56–57, 77. ——Chevreux, 1899, C.R. Assoc. Franc. Av. Sci., 27 (2): 484 (in part). ——Chevreux and Fage, 1925, Faune France, 9: 456–457, fig. 434 (in part). ——Pearse, 1936, Journ. Elisha Mitchell Sci. Soc., 52 (2): 193. ——Wells, 1961, Ecol. Monogr., 31 (3): 247.

Caprella magacephala Edward, A.M., 1868, Nouv. Arch. Mus. Hist. nat. Paris, 4: 89–91, pl. 20 fig. 12. Type locality: "Cap Sainte-Marie", Madagascar. "A une assez grande profondeur".

Caprella mendax Mayer, 1903, Siboga Exped. Mon., 34: 114, pl. 5 figs. 9–11, pl. 8 fig. 22. Type localities: Pacific Grove, Santa Barbara and San Diego, California.

Caprella monacantha Heller, 1866, Denkschr, Math.-Naturw. Cl. Akad. Wiss. Wien, 26: 54–55, pl. 4 figs. 17–19. ——Stalio, 1877, Atti. Ist. Veneto Sci. Lett. Art., (5) 3: 1125–1126. ——Stossich, 1881, Boll. Soc. Adriat. Sci. nat. Trieste, 6: 230. Type localities: Pirano, Lesina, Curzola, Italy.

Caprella obesa (not P.J. van Beneden, 1861) Haswell, 1880, Proc. Linn. Soc. New South Wales, 4: 348–349, pl. 24 fig. 1. ——Haswell, 1882, Catal. Austr. Crust.: 314. Type locality: "Clark Island, Port Jackson", Sydney, New South Wales, Australia.

Caprella obtusa Heller, 1866, Denkschr. Math.-Naturw. Cl. Akad. Wiss. Wien, 26: 54, pl. 4 fig. 16. ——Stalio, 1877, Atti. Ist. Veneto Sci. Lett. Art., (5) 3: 1390. ——Stossich, 1881, Boll. Soc. Adriat. Sci. nat. Trieste, 6: 230. Type locality: Lesina, Italy.

Caprella ultima Bate, 1862, Catal. Amphip. Curst. British Mus.: 364–365, pl. 57 fig. 9. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 72. Type locality: "Not recorded".

OCCURRENCE: Chichijima, collected by Sadae Takahashi, Aug. 16, 1928, 12 young, Coll. no. 92; Misaki, collected by Sadae Takahashi, Mar. 12, 1929, 1 male, 1 female, Coll. no. 93; Shodoshima, collected by Tomoyuki Fujimoto, Mar. 7, 1967, many males and females, attached to pearl oysters, Coll. nos. 61 and 138; Ohmuta Bay, collected by Tamotsu Matsunaga, Apr. 10, 1967, 5 males, 1 female, attached to farming net for *Undaria*, Coll. no. 132; Ajigasawa, Aomori Pref., collected by Kunio Takahashi, Mar. 25, 1968, 1 female, depth 15 meters, Coll. no. 167; Off Kanida-cho, collected by Yuji Tominaga, Apr. 9, 1968, many males and females, Coll. no. 185; Tateyama Bay, collected by Kunizo Tanaka, Apr. 8, 1968, 2 males, 2 females, Coll. no. 199; Off Odawara, collected by Isao Shibata, Apr. 10, 1968, 1 male, attached to sea nets, Coll. no. 188; Oumi and Itoigawa, collected by Shizuo Shoyama, Apr. 16, 1968, many males and females, taken from farming rope for *Undaria*, Coll. no. 202; Shirase, Ryozu Bay, collected by Toshihiko Tone, Mar. 21, 1968, 1 female, attached to set nets, Coll. no. 129; Off Uozu, Toyama Pref., collected by Tohsuke Shimazaki, Jun. 25, 1968, 1 male, attached to set nets, depth 10 meters, Coll. no. 296, collected by Shigeru Machinaka, Mar. 14, 1968, 4 males, attached to set nets, Coll. no. 124; Otomi, Fukui Pref., collected by Tohru Yasuda, Mar. 29, 1968, 7 males, 7 females, depth 5 meters, Coll. no. 191; Uchiura Bay, Fukui Pref., collected

by Tohru Yasuda, Mar. 28, 1968, depth zero meters, 2 males, 2 females, Coll. no. 193, depth 1 meter, 5 males, 3 females, Coll. no. 172, depth 2 meters, 2 males, 3 females, Coll. no. 194, depth 3 meters, 2 males, 4 females, Coll. no. 193; Arai, off Ito-shi, collected by Arai Fish. Union, May 22, 1968, 19 males, 3 females, attached to set nets, Coll. no. 266, collected by Tsunetaro Kitajima, Jun. 20, 1968, and collected by Arai Fish. Union, Jun. 20, 1968, 1 male, Coll. no. 65; Yatsu Bay, Shizuoka Pref., collected by Fuji Yatsu Fish. Union, Jun. 7, 1968, 1 male, Coll. no. 279; Off Itoh, collected by Itoh branch of Shizuoka Fish Exp. St., Jun. 25, 1968, 7 males, 1 female, Coll. no. 301; Ajiro, Shizuoka Pref., collected by Tomoyoshi Nakazai, May 25, 1968, 1 male, 1 female, Coll. no. 26; Kawana, Shizuoka Pref., collected by Shuichiro Isokawa, Jun. 21, 1968, 21 males, 5 females, attached to set nets, Coll. no. 347, 34 males, 2 females, Coll. no. 348, 11 males, 5 females, Coll. no. 349, 1 larva female, Coll. no. 350; Owase Bay, collected by Hagita, Owase Fish. Exp. St., Apr. 3, 1968, 1 male, Coll. no. 198; Kashikojima, collected by Yutaka Yamamura, Jun. 4, 1968, 1 male, depth 2 meters, Coll. no. 282; Off Onomichi, collected by Onomichi Agriculture and Forestry Office, May 6, 1968, 1 male, attached to rope for farming *Undaria*, Coll. no. 229; Off Numakuma, collected by Hamai and Yokoyama, Fukuyama Agriculture and Forestry Office, May 15, 1968, 1 male, attached to rope for farming *Undaria*, depth 2 meters, Coll. no. 245; collected by Masaaki Hamai, May 6, 1968, 1 male, Coll. no. 341; Uwajima Bay, collected by Ehime Fish. Exp. St., Feb. 27, 1968, 2 males, 1 female, attached to farming net for pearl oysters, Coll. no. 162, Mar. 18, 1968, many males and females, Coll. no. 157; Izari, Kii Sea, collected by Yasuhiko Jyo, May 6, 1968, 3 males, 4 females, attached to rope for farming *Undaria*, Coll. no. 225; Itoki, Ariake, Saga Pref., collected by Saga Thremmatological Exp. St., Jul. 8, 1968, many males and females, Coll. no. 11, collected by Ohura branch of Saga Thremmatological Exp. St., Aug. 10, 1968, 17 males, 4 females, attached to oyster farming nets, Coll. no. 313; Amura, Kumamoto Pref., collected by Tadashi Koba, Feb. 14, 1968, Coll. nos. 145, 149, Feb. 15, 1968, 3 males, Coll. no. 149; Shiranuhi, collected by Kumamoto Fish. Exp. St., Feb. 16, 1968, 2 males, attached to *Undaria* farming rope, Coll. no. 137; Yonohzu, Ohita Pref., collected by Yonohzu Fish. Cooperative Association, May 14, 1968, 2 males, Coll. no. 292; Aburatsu, off Nichinan-shi, collected by Taiyogyogyo Fish. Union, Mar. 10, 1968, 7 males, Coll. no. 208; Tassha Bay, Sado Island, zero meters, collected by Kitami and Arimoto, May 2, 1970, 5 males, 2 females, attached to *Undaria* farming rope, Coll. no. 422, depth 1 meter, 6 males, 3 females, Coll. no. 426, depth 5 meters, 2 males, Coll. no. 457, depth 5 meters, 73 males, 52 females, Coll. no. 462, depth 5 meters, 6 males, 7 females, Coll. no. 444, depth 5 meters, 1 male, Coll. no. 453, depth 5 meters, 5 males, 3 females, Coll. no. 438, depth 5 meters, 2 males, Coll. no. 447, depth 5 meters, 9 males, 4 females, Coll. no. 432, depth 10 meters, 1 female, Coll. no. 419, depth 17 meters, 1 male, Coll. no. 469, depth 10 meters, 2 males, Coll. no. 473, depth 18 meters, 1 male, Coll. no. 399; Off Futami, Sado Island, collected by Kitami and Arimoto, May 3, 1970, 1 male, attached to *Sargassum*, Coll. no. 633; Off Momoshima, Onomichi, collected by Takeshi Sakinaga, Jan. 29, 1970, attached to oyster farming nets,

Coll. no. 643; Yashirojima, Yamaguchi Pref., collected by Ken Tateishi, Nov. 16, 1970, from Takahiro Fujino, Coll. no. 645.

DESCRIPTION: Male: Body length of adult specimen 18 mm (Text-fig. 106, A); pereonite II longer than any other, I a little shorter than II, pereonites III, IV and V subequal and a little shorter than I, VI and VII taken together a little shorter than V; head smooth but angularly projecting in front, pereonite I smooth and very long, pereonite II furnished posteriorly with a straight triangular flat tooth in ventral medial line between gnathopods 2, pereonites III and IV smooth except for a ventro-lateral tooth on each side situated at fore end, pereonite V constricted in front and with a ventro-lateral tooth on each side at fore end.

Antenna 1 about two-thirds of the body length, its segment 1 of peduncle longer

Fig. 106. *Caprella* (*Rostrhicephala*) *equilibra* Say.
A, adult male (Arimoto, 1971); B, young male (material from Tsuruga Bay, Fukui Pref., Coll. no. 193); C, young male (material from Otomi, Fukui Pref., Coll. no. 191); D, larva of male (material from Kawana, Shizuoka Pref., Coll. no. 348).

than head, 2 more than twice length of 1, 3 longer than half of 2, flagellum 13-segmented, a little shorter than segment 3 of peduncle and suddenly becomes narrow distally; antenna 2 a little shorter than peduncle of antenna 1, with swimming setae.

Mandibles with large cutting teeth, edges divided into 5, strong, lacinia mobilis definitely divided like principal plate, with 2 or 3 setal rows, molar tubercle strong, with a powerful tooth on front border giving the crown a very irregular outline; inner lobe of maxilla 1 undeveloped, outer lobe smaller than palp, bearing seven spines at distal margin, segment 1 of palp short, segment 2 widening towards the obliquely convex dentate distal part, with many slender spines on apical surface and inner margin; inner lobe of maxilla 2 shorter and more oval than outer with many slender spines with round apical margin and descending toward inner margin for some distance, outer lobe oblong, with many long spines on apical margin; inner

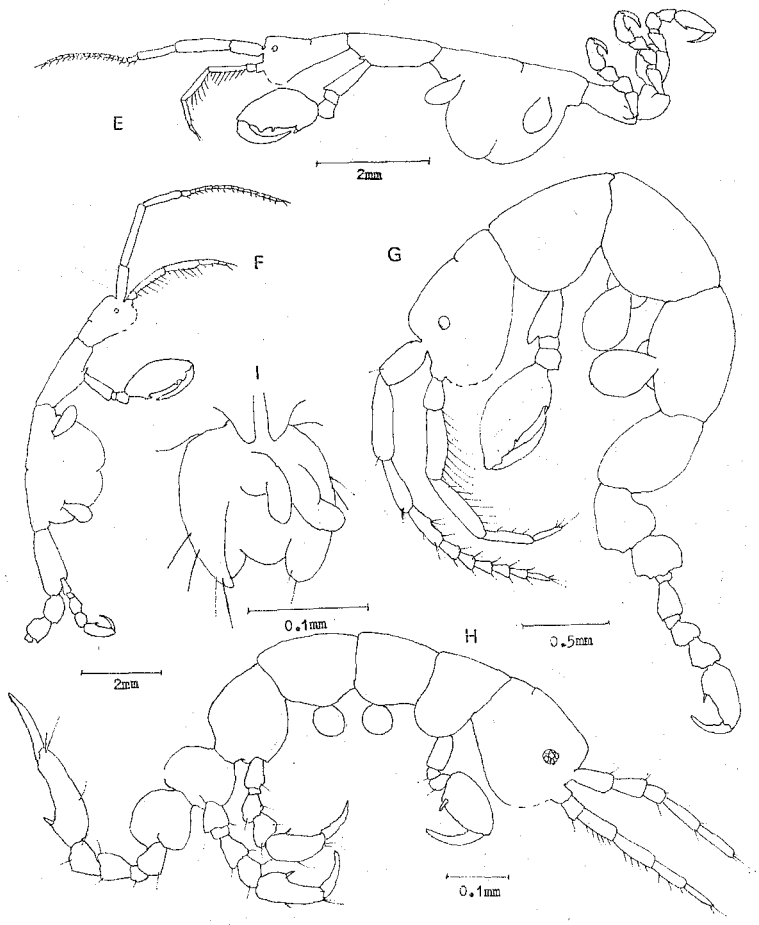

Fig. 107. *Caprella* (*Rostrhicephala*) *equilibra* Say.
E, adult female (meterial from Ajigasaki, Aomori Pref., Coll. no. 167); F, adult female (material from Misaki, Kanagawa Pref., Coll. no. 93); G, young female (material from Kawana, Shizuoka Pref., Coll. no. 349); H, larva (material ditto, Coll. no. 348); I, abdomen of male.

lobe of maxillped small and scarcely reaching beyond base of segment 1 of palp, widening distally, with 4 long narrow spines near distal part of apical margin, outer lobe as long as inner, with several long narrow spines, segment 1 of palp stout, with spines on inner margin and one below center of outer margin, segment 2 stouter than 1, scarcely twice as long as broad, inner margin fringed with long spines, segment 3 a little shorter than 2, its inner margin crowded with spines, especially on inner surface.

Gnathopod 2, originating from posterior part of pereonite II, basal segment quite short, propodus very large and oblong in form, tapering distally, palm sparingly setous, palmar spine located at base and provided with a grasping spine at point, poison tooth situated near by a triangular tooth at distal angle of palm, with narrow notch in between.

Gills oval to elliptical.

Pereopod 5 a little longer than pereonite V, 6 a little longer than 5, 7 a little longer than 6, propodus of 5–7 robust with 2 grasping spines proximally.

Abdomen, typical of genus.

Female: Body very much smaller than male, length of specimen 8 mm (Text-fig. 107, E); female very like male, except for the development of oostegite; pereonite I about as long as head, pereonite II longer than any other segment, III a little shorter than II, IV a little shorter than III, V a little shorter than IV, VI and VII taken together a little shorter than V.

Antenna 1 a little shorter than half of the body length, its flagellum 16-segmented; gnathopod 2 attached rather to front part of pereonite II, propodus large, a little shorter than pereonite II and twice as long as wide, located proximally with a projecting palmar angle bearing a spine, small poison tooth situated near by a triangular tooth at distal angle of palm. Gills oval in form.

GROWTH: Larva: When hatched, 0.9 mm in body length (Text-fig. 107, H); pereonites II-V subequal in length, VI and VII a little shorter than V; body smooth.

Antenna 1 short, its flagellum 2-segmented; antenna 2 subequal to 1 in length; gnathopod 2 attached to middle of pereonite II, its propodus a little shorter than pereonite II, and one and a half times as long as its greatest breadth, setiferous with a pair of palmar teeth, palm slightly convex with few spines, wrist very small but clear. Gills small and circular.

Larva: Body length 4 mm (Text-fig. 106, D); body smooth; pereonites III, IV and V more elongated than II; flagellum of antenna 1 grows into 6 segments; propodus of gnathopod 2, poison tooth and triangular tooth developed. Gills transformed to an oblong shape.

Young female: Body length 4.5 mm (Text-fig. 107, G); body smooth; pereonite II most elongated, small oostegite lobes appear at pereonites III and IV; flagellum of antenna 1, 7-segmented.

Young male: Body length of specimen 9 mm (Text-fig. 106, C); pereonites I and II partially well developed; flagellum of antenna 1, 11-segmented; palmar spines of propodus of gnathopod 2 transformed to one spine from a pair of spines.

Young male: Body length of specimen 14 mm (Text-fig. 106, B); pereonite II longest of all segments, III a little shorter than II, IV and V subequal in length, and a little shorter than III, VI and VII taken together a little shorter than V, pereonites II-V with lateral spines; flagellum of antenna 1, 13-segmented; gnathopod 2 attached to rear part of pereonite II.

Growth of gnathopod 2: The wrist very clear in males of body length 1.1 mm, 2.5 mm and 4 mm, but in case of body length 14 mm it fused to segment 5; at body

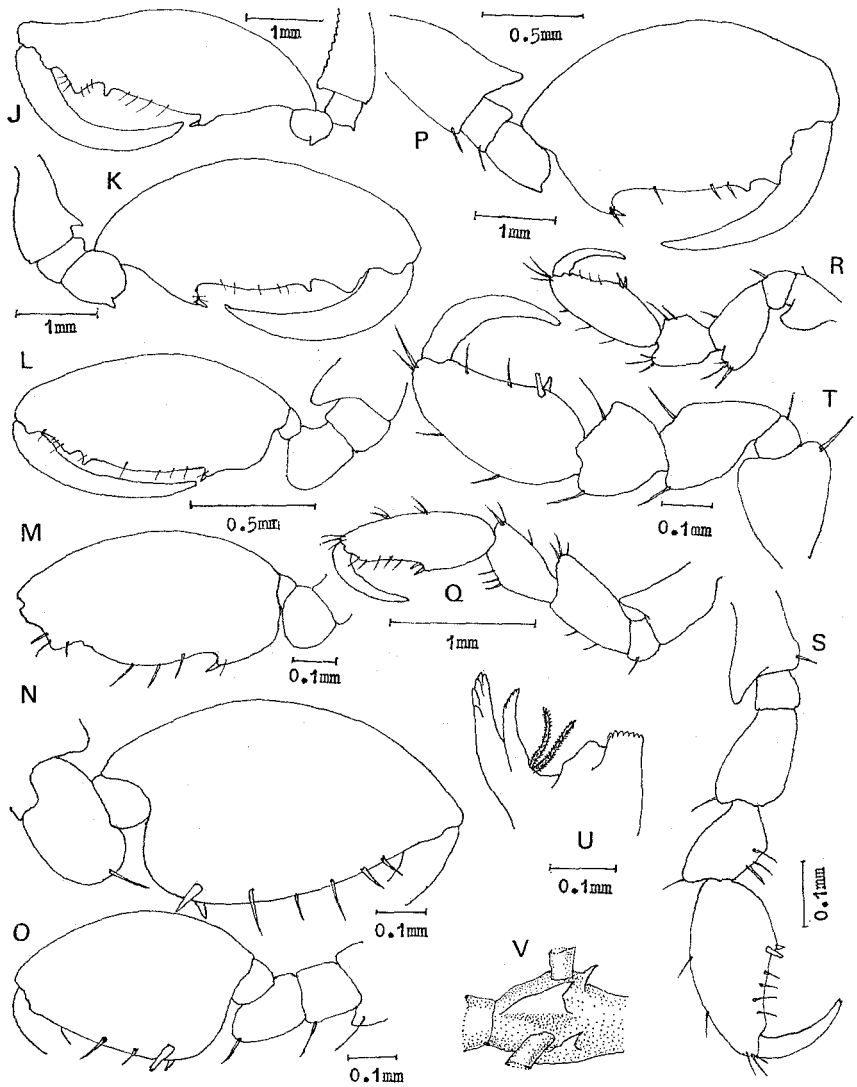

Fig. 108. *Caprella (Rostrhicephala) equilibra* Say.
J, gnathopod 2 of 21 mm long male; K, ditto 14 mm long male; L, ditto 9 mm long male; M, ditto 4 mm long male; N, ditto 2.5 mm long male; (J-N, Arimoto, 1971); O, ditto 1.1 mm long male; P, ditto 11 mm long female; Q, pereopod 5; R, ditto 7; S, ditto 7 of young; T, ditto 5 of larva; U, mandible; V, ventral tooth of pereonite II.

length 1.1 mm the propodus oval in shape, dilated posteriorly and narrow anteriorly, palmar margin slightly convex with a pair of palmar spines; at body length 2.5 mm it becomes long ova, palmar margin convex with few spines; at body length 4 mm palmar angle and palmar spine transformed to one, and small poison tooth and triangular tooth developed; at body length 14 mm palmar angle becomes narrow, and at body length 21 mm it becomes very specialized in shape.

DISTRIBUTION: Type locality: South Carolina. "I found them common in the Bay of Charleston, particularly at Sullivan's Island, on the two species of *Gorgonia* so common in the salt water creeks of our Southern coast" (Say, 1918).

Other records: Sweden and Norway to the Mediterranean Sea including the British Isles; Mediterranean Sea; (?) Black Sea; Azores; Tropical West Africa; St.

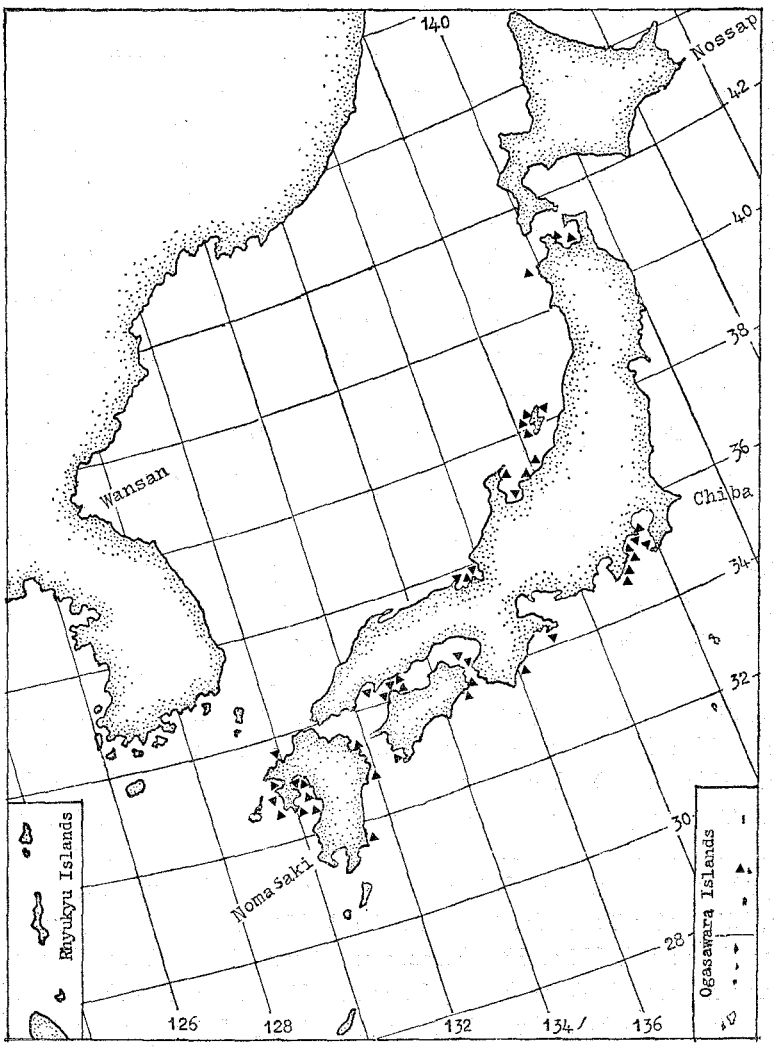

Fig. 109. Distribution records of *Caprella (Rostrhicephala) equilibra* Say around Japan.

Helena Island; Southwest Africa; South Africa; Madagascar; Mid-North Atlantic and Sargasso Sea; Bermuda; East coast of United States from Connecticut to Georgia; Fernandina, entrance to St. Johns River, St. Augustine, Daytona, Cape Kennedy, Off Ft. Lauderdale, Biscayne Bay, and Panama City, Florida; Grand Isle, Louisiana; Galveston, Port Aransas, and Port Isabel, Texas; Trinidad; Puerto Cabello, Venezuela; Sacco São Francisco, Cabo Frio, Nictherey, and Rio de Janeiro, Brazil; Mid-South Atlantic off Brazil; Mar del Plata, Argentina; Valparaiso, Chile; Taboga Island, Panama; between Panama and the Galapagos Islands; Estera de la Luna, Sonora, Mexico; California; Vancouver Island, British Columbia; Hawaii; Philippine Islands; New South Wales, Victoria, Tasmania and Fremantle, Australia; New Zealand; Hong Kong; Singapore, Malaysia. Depth range: surface (?) to 3000 meters; cosmopolitan.

Other localities around Japan: Nagasaki (Mayer, 1903: 89); Asamushi (Utinomi, 1947: 72); Misaki (Utinomi, 1947: 72); Mukaijima, Hiroshima Pref. (Utinomi, 1947: 42); Saganoseki, Ohita Pref. (Utinomi, 1947: 72); Ohmura Bay, Nagasaki Pref. (Irie, 1958: 107); Sasebo (Irie, 1958: 91); Sagami Bay (Hirosaki, 1964: 68); Tomioka, Kumamoto Pref. (Utinomi, 1964: 14); Shodoshima, Kagawa Pref. (Tomoyuki Fujimoto, 1967, Coll. no. 61); Otomi, Fukui Pref. (Tohru Yasuda, 1968, Coll. no. 641); Kawana Bay, Shizuoka Pref. (Shuichiro Isokawa, 1968, Coll. no. 347); Momoshima, Hiroshima Pref. (Fukuyama Agriculture and Forestry Office, 1969, Coll. no. 643); Ryozu Bay (Arimoto, 1971: 16); No-machi, Niigata Pref. (Ito, 1970: 29); Tassha Bay (Arimoto and Kitami, 1970, Coll. no. 399); Off Futami, Sado Island (Arimoto and Kitami, 1970, Coll. no. 633); Ohoshima, Tokuyama, Yamaguchi Pref. (Inland Fisheries Research Institute, 1970, Coll. no. 645); Kanida-cho, Aomori Pref. (Arimoto, 1971: 16); Ajigasawa, Aomori Pref. (Arimoto, 1971: 16); Tateyama Bay (Arimoto, 1971: 16); Chichijima (Arimoto, 1971: 16); Off Odawara-shi (Arimoto, 1971: 16); Oumi, Itoigawa, Niigata Pref. (Arimoto, 1971: 16); Uozu, Toyama Pref. (Arimoto, 1971: 16); Udezu, Noto, Ishikawa Pref. (Arimoto, 1971: 16); Turuga Bay (Arimoto, 1971: 16); Uchiura, Fukui Pref. (Arimoto, 1971: 16); Arai Bay, Shizuoka Pref. (Arimoto, 1971: 16); Yazu Bay (Arimoto, 1971: 16); Off Itoh (Arimoto, 1971: 16); Ajiro Bay (Arimoto, 1971: 16); Owase Bay, Mie Pref. (Arimoto, 1971: 16); Ago Bay (Arimoto, 1971: 16); Onomichi, Hiroshima Pref. (Arimoto, 1971: 16); Numakuma-cho (Arimoto, 1971: 16); Uwajima Bay, Ehime Pref. (Arimoto, 1971: 16); Kii-Suido (Arimoto, 1971: 16); Ohmuta, Ariake, Fukuoka Pref. (Arimoto, 1971: 16); Off Tara-cho, Saga Pref. (Arimoto, 1971: 16); Off Takezaki, Saga Pref. (Arimoto, 1971: 16); Shiranuhi Sea, Kumamoto Pref. (Arimoto, 1971: 16); Kaminoshima, Amakusa, Nagasaki Pref. (Arimoto, 1971: 16); Amura (Arimoto, 1971: 16); Yonozu, Ohita Pref. (Arimoto, 1971: 16); Off Aburazu, Miyasaki Pref. (Arimoto, 1971: 16); Yokosuka (Utinomi, 1973: 33); Kojima beach, Ozaki, Sennan, Osaka Bay (Utinomi, 1973: 33); Kurushima Strait, Ehime Pref. (Utinomi, 1973: 33); Kanmuri-jima, Wakasa Bay (Utinomi, 1973: 33); Kushimoto, Wakayama Pref., (coll. K. Hayashi); Off Hiroshima-shi, (coll. Y. Arakawa); Otomi, Fukui Pref. (coll. T. Yasuda).

Additional collection: Misaki (Arimoto, 1950, Coll. no. 93); Tsuruga Bay (Tohru Yasuda, 1968, Coll. no. 194); Numakuma-cho, Hiroshima Pref. (Fukuyama Agriculture and Forestry Office, 1969, Coll. no. 341); Tassha Bay, Niigata Pref. (Arimoto and Kitami, 1970, Coll. nos. 421, 426, 432, 438, 444, 447, 453, 457, 462, 469, 473, 491); Kanida-cho, Aomori Pref. (Arimoto, 1971: 16); Ajigasawa, Aomori Pref. (Arimoto, 1971: 16); Ryozu Bay (Arimoto, 1971: 16); Tsuruga Bay (Arimoto, 1971: 16); Uchiura, Fukui Pref. (Arimoto, 1971: 16); Arai Bay, Shizuoka Pref. (Arimoto, 1971: 16); Shodoshima, Seto Inland Sea (Arimoto, 1971: 16).

65. *Caprella* (*Rostrhicephala*) *obtusifrons* Utinomi, 1943

(Jap. name: *Kakuhana-warekara* Utinomi, 1971)

Fig. 110.

Caprella obtusifrons Utinomi, 1943, Journ. Fac. Sci. Hokkaido Imp. Univ., (6) 8 (3): 292–294, fig. 8. ——Utinomi, 1947, Seibutsu (suppl.), 1: 75. ——Hirosaki, 1964, Misc. Rep. Res. Inst. Nat. Resources, 62: 68. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 32. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 27 (6): 44. ——Utinomi, 1973, Bull. Biogeogr. Soc. Japan, 29 (5): 34.

Occurrence: Akkeshi Bay, collected by Zen Nagao, Aug. 6, 1967, 32 males, 19 females, Coll. no. 249.

Description: Male: Body length of adult specimen 7.4 mm (Text-fig. 110, A); pereonite III and IV subequal in length, and longest of all segments, II and V subequal and a little shorter than IV, VI and VII taken together a little longer than V, I about twice as long as head; head angularly projecting in front, pereonites II and III smooth, pereonite IV almost smooth, though with a minute ventro-lateral tooth at hind end, pereonite V deeply constricted on the front part of back, with a rounded lateral tubercle near front on each side.

Antenna 1 short and a little shorter than half of the body length, flagellum 10-segmented; antenna 2 a little shorter than antenna 1 and with several setae on flagellum; gnathopod 2 attached to middle of pereonite II, its segment 1 about as long as half of pereonite II and broader than half of its length, propodus densely covered with feathered hairs on all its surface, hind margin of palm slightly concave, without any trace of palmar clasping spine and poison tooth, distal and proximal ends of palm evenly rounded. Gills oval. Pereopods 5 to 7 short and rather broad, propodus with two clasping spines on palmar projection. Abdomen of usual type; penes medial.

Female: Body length of adult specimen 5.8 mm (Fig. 108, B). It differs from male mainly in following points.

Pereonite I much shorter than half of the head. Gnathopod 2 attached to near fore end of pereonite II and slightly hairy, propodus of young females (Fig. 108, E) having a clasping spine on palmar angle and a subpalmar spine. Pereonite V provided with a pair of tubercles near hind end of ventral surfaces.

Distribution: Type localities: Aikappu and Daikokuzima, Akkeshi Bay (Utinomi, 1943: 292).

Other locality around Japan: ?Sagami Bay (Hirosaki, 1964: 68); Bentenjima,

Nemuro (Utinomi, 1973: 34); Naka-umi, Shimane Pref. (Utinomi, 1973: 33).

Additional collection: Akkeshi Bay (collected by Zen Nagao, 1967, Coll. no. 249, Arimoto, 1971: 44).

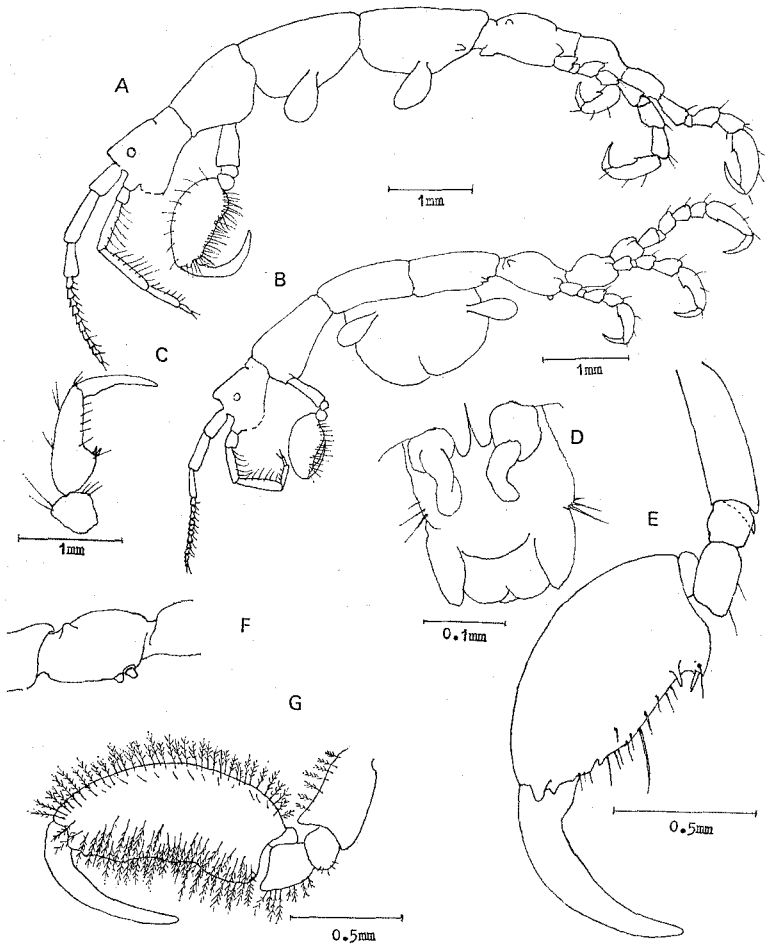

Fig. 110. *Caprella* (*Rostrhicephala*) *obtusifrons* Utinomi (after Utinomi).
A, male; B, female; C, propodus of pereopod 7; D, abdomen of male; E, gnathopod 2 of young male; F, lateral view of pereonite V of female; G, gnathopod 2 of adult male.

66. *Caprella* (*Rostrhicephala*) *brevirostris* Mayer, 1903

(Jap. name: *Semushi-warekara* Arimoto, 1971)

Figs. 111, 112.

Caprella brevirostris Mayer, 1903, Siboga Exped. Mon., 34: 95–96, pl. 3 fig. 45, pl. 7 figs. 74–76. ——Hewatt, 1946, Ecol. Monogr., 16 (3): 199, 202, 204. ——Utinomi, 1947, Seibutsu (suppl.), 1: 73. ——Dougherty and Steinberg, 1953, Proc. biol. Soc. Washington, 66: 44, 47. ——Dougherty and Steinberg, 1954, in Light et al., Intertidal Invert. Centr. Calif. Coast: 170, 171. ——Johnson and Juskevice, 1965, Res. Rep. Pacific Mar. Sta., 5: 38. ——McCain, 1970, Crust. Catal. 2, Caprellidea,

1: 14. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 14.

Caprella septentrionalis (not Kröyer, 1843), La Follette, 1914, Journ. Ent. Zool. Pomona Coll., 6 (4): 223–224, pl. 4.

No specimen in the author's collection.

OCCURRENCE: Korean Straits (34°40′ N., 129°50′ E., to 32°2′ N., 128°45′ E.; Mayer, 1903: 95–96).

DESCRIPTION: Reproduced from Mayer's description (1903).

Male: Body length of adult specimen 12 mm (Fig. 111, A), body smooth except pereonites V-VII; pereonite II longer than any other pereonite, I a little shorter than II, pereonites III and IV subequal in length and as long as half of I, V a little shorter than IV, VI and VII taken together a little shorter than V; head

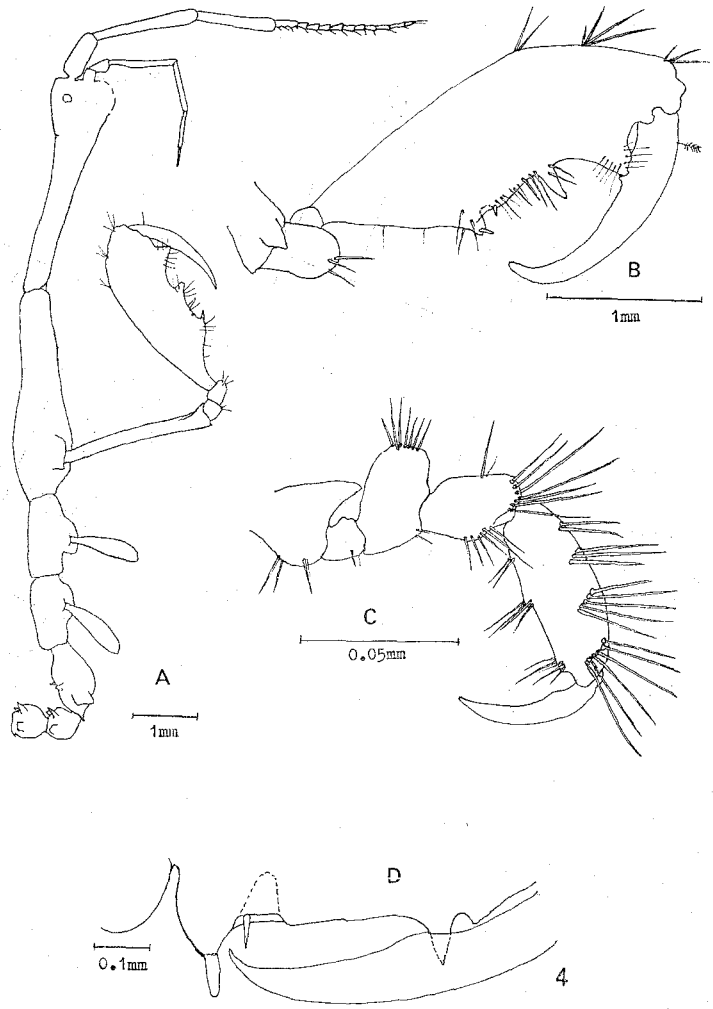

Fig. 111. *Caprella* (*Rostrhicephala*) *brevirostris* Mayer (after Mayer).
A, adult male; B, propodus of gnathopod 2 of male; C, pereopod 7 of young male; D, palmar margin of propodus of female's gnathopod 2.

very slightly produced angularly in front, pereonite II broader than I, pereonites III-V narrower than II, pereonites V-VII each with a pair of small dorsal spine teeth.

Antenna 1 as long as half of body length, its flagellum shorter than peduncel and made up of 11 segments; antenna 2 slightly shorter than peduncle of antenna 1; gnathopod 2 attached to distal end of pereonite II, and strong, its segment 1 a little shorter than pereonite II, and nearly as long as propodus, propodus strong and more than three times as long as its greatest breadth, with setiferous projection, a palmar tooth and subpalmar spine, poison tooth large and situated near by a large triangular tooth at distal angle of palm, with narrow notch in between, palm fringed with small spines and spinules. Gills elongate. Pereopods 5–7 similar in structure,

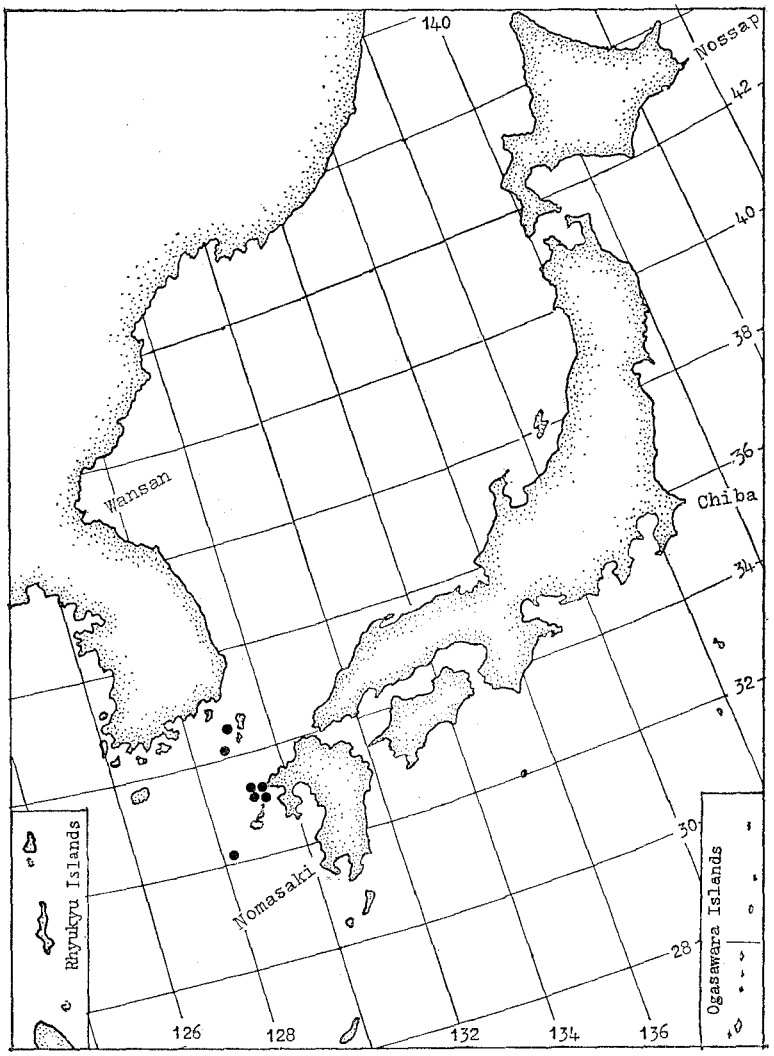

Fig. 112. Distribution records of *Caprella* (*Rostrhicephala*) *brevirostris* Mayer around Japan.

propodus armed with three clumps of spines on small prominences of inner margin, four clumps of spines at outer margin.

Female: Body length 5 mm; antenna 1 with flagellum 10-segmented; gnathopod 2 with palmar angle situated proximally with projecting and bearing a spine and a subpalmar spine, poison tooth large and situated nearly triangularly, with shallow notch, triangular at distal angle of palm, and with a small triangular tooth.

DISTRIBUTION: Type localities: 34°15′ N., 128°51′ E., 45.5 meters, 33°10′ N., 129°18′ E., 33°08′ N., 129°20′ E., 33°09′ N., 129°18′ E., 33°00′ N., 129°24′ E., 54.6 meters; 33°00′ N., 129°25′ E., 54.6 meters; 32°12′ N., 128°10′ E., 182 meters; and Pacific Grove, California.

Other records: Santa Cruz Island, Tomales Point, and Laguna Beach, California.

Localities around Japan: West Goto Island (Mayer, 1903: 95–96); West Tsushima Island (Mayer, 1903: 95–96).

67. *Caprella (Rostrhicephala) penantis* Leach, 1814

(Jap. name: *Maruera-warekara* Utinomi, 1964)

Figs. 113, 114, 115.

Caprella Penantis Leach, 1814, Brewster's Edinburgh Encycl., 7 (2): 404.

Caorella penantis Stebbing, 1910, Mem. Austr. Mus., 4 (12): 653. ——(?) Hale, 1929, Crust. South Australia: 233–234. ——(?) Schellenberg, 1931, Zool. Res. Swedish Antarctic Exped., 2 (6): 266, 272. ——McCain, 1968, Bull. United States Nat. Mus., 278: 33–40, figs. 15–16, 51. ——Pequegnat and Pequegnat, 1968, Res. Rep. Texas. Agr. Univ. (Oceanogr.): 24, 33–34. ——McCain, 1970, Crust. Catal. 2, Caprellidea, 1: 33. ——Utinomi, 1973, Add. Records of Caprellidae from Japan, Bull. Biogeogr. Soc. Japan, 29 (5): 34.

Caprella acutifrons Latreille, 1816, Nouv. Dict. Hist. nat., (ed. 2) 6: 433. ——(?) Desmarest, 1823, Dict. Sci. nat., 28: 363. ——(?) Desmarest, 1825, Consid. gén. Class. Crust., 277. ——(?) Drapiez, 1837, Dict. class. Sci. nat., 2: 353. ——(?) H. Milne Edwards, 1840, His. nat. Crust., 3: 108. ——(?) White, 1847, List Crust. British Mus.: 92. ——(?) Cocks, 1849, Ann. Rep. Roy. Cornwall Polytechn. Soc., 17: 83. ——(?) White, 1850, List British Anim. British Mus., 4 (Crust.): 60. ——(?) Gosse, 1855, Man. mar. Zool. British Isles, 1: 131. ——(?) Bate, 1856, Rep. British Ass. Adv. Sci.: 60. ——(?) White, 1857, Pop. Hist. British Crust.: 216. ——(?) Bate, 1862, Catal. Amphip. Crust. British Mus.: 356, pl. 56 fig. 6. ——Bate and Westwood, 1868, Hist. British Crust., 2: 60–62, 1 fig. ——(?) Norman, 1869, Rep. British Ass. Adv. Sci., 1868: 262. ——Parfitt, 1873, Rep. Trans. Devonshire Ass. Adv. Sci., 6 (1): 250. ——(?) Maitland, 1874, Tijdschr. Nederl. dierk. Ver., 1 (3): 245. ——(?) Stalio, 1877, Atti Ist. Veneto Sci. Lett. Art., (5) 3: 1125. ——(?) Bate, 1878, in Couch, Journ. Roy. Inst. Cornwall, 19: 509. ——(?) Haller, 1880, Zeitscher. wiss. Zool., 33: 404. ——(?) Haller, 1879, Zool. Anz., 2 (27): 232. ——(?) Delage, 1881, Arch. Zool. exp., (A) 9 (42): 131–132, 155, pl. 10 figs. 11–12. ——Stossich, 1881, Boll. Soc. Adriat. Sci. nat. Trieste, 6: 230. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 48–50, pl. 1 fig. 9, pl. 2 figs. 12–22, pl. 4 figs. 26–28, pl. 5 figs. 15, 22, 23 (in part). ——(?) Marion, 1883, Ann. Mus. Hist. nat. Marseille, (Zool.) 1 (1): 49. ——(?) Carus, 1885, Prodr. Faunae Mediterr., 1: 388. ——Norman, 1886, Museum Normanianum, (ed. 1) 3: 17. ——Pelseneer, 1886, Bull. Mus. Hist. nat. Belgique, 4: 218. ——(?) Bonnier, 1887, Bull. Sci. Dept. Nord., 10: 353. ——(?) Chevreux, 1887, Bull. Soc. zool. France, 12: 318, 335. ——(?) Bate, 1888, in Heape, Journ. mar. biol. Ass. United Kingdom, 1 (2): 175. ——(?) Barrois, 1888, Catal. Crust. Açores: 57–58, 77. ——(?) Chevreux, 1888, Bull. Soc. zool. France, 13: 33. ——(?) Chevreux, 1888, Bull. Soc. Etud. sci. Paris: 9. ——(?) Girard, 1888, Bull. sci. France Belg., (3) 1: 509. ——(?) Vosseler, 1889, Arch.

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Caprella Acutifrons (?) Herklots, 1861, Tijdschr. Entomol., 4: 43.

Caprella angusta Dougherty and Steinberg, 1953, Proc. biol. Soc. Washington, 66: 44, 47. ——Dougherty and Steinberg, 1954, in Light et al., Intertidal Invert. Centr. Calif. Coast: 171. ——Johnson and Juskevice, 1965, Res. Rep. Pacific Mar. Sta., 5: 38.

Caprella carolinensis Steinberg and Dougherty, 1957, Tulane Stud. Zool., 5 (11): 270–273, fig. 3–7.

Caprella Cornalia Nardo, 1896, Mem. Lst. Veneto Sci., 14: 333–334, pl. 15 fig. 6. ——Krapp-Schickel, 1969, Zool. Jb. Syst., 96: 285. Type locality: Adriatic Sea.

Caprella geometrica Say, 1818, Journ. Acad. nat. Sci. Philadelphia, 1: 390–391. ——De Kay, 1844, Zoology New-York, 6: 41. ——White, 1847, List Crust. British Mus.: 92. ——Gibbes, 1848, in Tuomey.

Rep. Geol. South Carolina, app.: 16. ——Gibbes, 1849, in White, Statistics State Georgia: 23. ——Bate, 1862, Catal. Amphip. Crust. British Mus.: 357, pl. 56 fig. 8. ——Verrill and Smith, 1873, Rep. United States Fish. Comm., 1: 316–317, 480, 567, pl. 5 fig. 20. ——Uhler, 1879, Sci. Res. Chesapeake Zool. Lab. 1878, 1 (3): 26–27. ——R. Rathbun, 1880, Proc. United States Nat. Mus., 3: 121. ——Holmes, 1905, Bull. United States Bur. Fish., 24: 526, 1 fig. ——Paulmier, 1905, Bull. New York State Mus., 91 (Zool. 12): 168, fig. 38. ——Norman, 1905, Museum Normanianum, (ed. 2) 3: 26. ——Sumner, Osburn and Cole, 1913, Bull. United States Bur. Fish., 31: 132, 134, 135, 657, map. 102. ——Pearse, 1912, Proc. United States Nat. Mus., 43 (1936): 378. ——LaFollette, 1914, Journ. Ent. Zool. Pomona Coll., 6 (4): 222–223, Pls. 1–3. ——Kunkel, 1918, Bull. Connecticut State Geol. nat. Hist. Surv., 26 (1): 178–180, fig. 55. ——Allee, 1923, Biol. Bull., 44 (5): 213. ——Wood and Wood, 1932, Journ. exp. Zool., 62 (1): 18. ——McCain, 1965, Chesapeake Sci., 6 (3): 194–196, fig. 1c, g, 2a-f. Type localities: "salt-water bays" of the east coast of the United States.

Caprella neglecta Vassilenko, 1967, Explor. Fauna Seas USSR, 5 (13): 200–203, figs. 5–6. —— Utinomi, 1968, Publ. Seto mar. biol. Lab., 16 (4): 287–288. ——Utinomi, 1969, Publ. Seto mar. biol. Lab., 16 (5): 302. ——Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 19.

(?) *Caprella novae-zealandiae* Kirk, 1878, Ann. Mag. nat. Hist., (5) 2: 465–466. ——Kirk, 1878, Trans. Proc. New Zealand Inst., 11: 393. ——Thomson, 1879, Ann. Mag. nat. Hist., (5) 4: 330. Type locality: Cook Strait, New Zealand.

(?) *Caprella Novae-Zealandiae* Mayer, 1882, Fauna Flora Golf. Neapel, 6: 71–72. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 76.

(?) *Caprella obesa* (not Haswell, 1880) P.J. van Beneden, 1861, Mem. Acad. Roy. Belgique, 33: 99, 146. ——Maitland, 1874, Tijdschr. Nederl. dierk. Ver., 1 (3): 245. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 55. ——Pelseneer, 1886, Bull. Mus. Roy, Hist. nat. Belgique, 4: 218. Type locality: On the shark *Somniosus microcephalus* (Bloch and Schneider) (as *Scimnus glacialis*), Belgian coast.

Caprella Pennantii (?) Johnston, 1835, Mag. nat. Hist., 8: 671. ——(?) Bate, 1856, Rep. British Ass. Adv. Sci., 25: 60. ——Bate, 1857, Ann. Mag. nat. Hist., (2) 19: 151. ——(?) McAndrew, 1861, List British mar. Fauna: 28. ——(?) Couch, 1864, Nat. Hist. Trans. Antiquarian Soc. Penzance, 2: 97.

(?) *Caprella pennantii* Bate, 1888, in Heape, Journ. mar. biol. Ass. United Kingdom, 1 (2): 175.

(?) *Caprella spinifrons* Nicolet, 1849, in Gay, Hist. fis. polit. Chile, 3: 253. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 70. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 74. ——Reed, 1897, Rev. Chilena Hist. nat., 1: 11 (4). Type locality: Chile.

Caprella acutifrons f. *andreae* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 51, 55–59, pl. 2, fig. 38, pl. 4, figs. 56, 70–71.

Caprella acutifrons f. *angusta* Mayer, 1903, Siboga Exped. Mon., 34: 82, pl. 3 fig. 4. Type localities: Santa Catalina, Avalon and Pacific Grove, California, U.S.A.

Caprella acutifrons f. *carolinensis* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 56, pl. 2 fig. 40, pl. 4 figs. 59, 65. Type locality: Charleston, South Carolina.

(?) *Caprella acutifrons* f. *gibosa* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 55, pl. 2 fig. 39, pl. 4 figs. 55, 69. Type locality: Coquimbo, Chile.

(?) *Caprella acutifrons* f. *lusitanica* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 56, pl. 4 figs. 53, 66. Type locality: Sines, Portugal.

Caprella acutifrons f. *natalensis* Mayer, 1903, Siboga Exped. Mon., 34: 81, pl. 3 figs. 22, 23. —— Arimoto, 1930, Journ. Tokyo Nat. Hist. Soc., 28 (39): 48–49, fig. 3. ——Hiro (=Utinomi), 1937, Annot. Zool. Japon., 16 (4): 312, pl. 22 fig. 5. ——Stephensen, 1949, Res. Norwegian Sci. Exped. Tristan da Cunha, 19: 53–54, 56, 58. Type locality: "Port Natal",=Durban, Natal, S. Africa.

Caprella acutifrons f. *neglecta* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 55, pl. 2 fig. 37, pl. 4 figs. 57–58, 67. ——Mayer, 1903, Siboga Exped. Mon., 34: 80. ——Utinomi, 1943, Sci. Rep. Tohoku imp. Univ., (Biol. 4) 17 (3): 273–274, figs. 2a, 3a. ——Utinomi, 1943, Sci. Rep. Tohoku imp Univ., (Biol. 4) 17 (3): 282–293, fig. 2. ——Utinomi, 1943, Journ. Fac. Sci. Hokkaido Imp. Univ., (6) 8 (3): 284, fig. 1. ——Utinomi, 1947, Seibutsu (suppl.), 1: 72. ——Utinomi, 1958, Col. Illustr. seashore Anim. Japan: 56, pl. 27 fig. 16. ——Utinomi, 1964, in Kikuchi, Fauna Flora Sea Amakusa mar.

biol. Lab., 5: 14, pl. 1 fig. 2a, pl. 3 fig. 5. ——Bieri and Tokioka, 1968, Publ. Seto mar. biol. Lab., 15 (5): 383. Type locality: Hongkong.

Caprella acutifrons f. *porcellio* Mayer, 1903, Siboga Exped. Mon., 34: 81–82. Type locality: "Kalk Bay (Cape Peninsula; "between tide marks in rock-pools")", S. Africa.

Caprella acutifrons f. *tabida* (not Mayer, 1903) Mayer, 1890, Fauna Flora Golf. Neapel, 17: 54–55, pl. 2 fig. 36, pl. 4 figs. 52, 61. Type locality: Algeria.

Caprella acurifrons f. *testudo* Mayer, 1903, Siboga Exped. Mon., 34: 82. ——Chevreux and Fage, 1925, Faune France, 9: 452, fig. 430t. Type localities: "Royan. Zwischen Arcachon und Marennes (45°40′ N.)" and "St. Jean de Luz", both S.W. France.

Caprella acutifrons f. *tibada* Mayer, 1903, Siboga Exped. Mon., 34: 80. Type locality: "Küste von Algier", Algeria, N. Africa.

Caprella acutifrons f. *virginia* Mayer, 1890, Fauna Flora Golf. Neapel, 17: 56, pl. 2 fig. 41, pl. 4 fig. 60. Type locality: Old Point Comfort, Virginia.

Caprella neglecta barbigra Arimoto, 1971, Bull. Biogeogr. Soc. Japan, 26 (3): 19–20.

Caprella penantis f. *natalensis* Stebbing, 1910, Ann. South African Mus., 6 (4): 465–466. ——Barnard, 1916, Ann. South African Mus., 15 (3): 281–282.

Caprella penantis f. *porcellio* Stebbing, 1910, Ann. South African Mus., 6 (4): 466.

OCCURRENCE: Awajishima, Seto Insland Sea, collected by Asajiro Oka, Apr. 11, 1920, 2 males, 1 female, Coll. no. 2, 13 males, 3 females, Coll. no. 66; Tateyama Bay, collected by Arimoto, May 7, 1927, 2 males, Coll. nos. 55, 56, 1 male, 1 female, Coll. no. 57, collected by Yaichiro Okada, Oct. 10, 1927, 1 male, Coll. no. 58, collected by Arimoto, Mar. 24, 1928, 13 males, 3 females, Coll. no. 13, 4 females, Coll. no. 14, collected by Sadae Takahashi, May 5, 1928, many males and females, Coll. no. 21, collected by Arimoto, Aug. 21, 1928, 12 males, 1 female, attached to *Sargassum*, Coll. no. 30, 1 male, attached to *Bugula*, Coll. no. 88, 2 males, 2 females, attached to set nets, Coll. no. 53, Aug. 22, 1928, 2 males, 2 females, attached to set nets, Coll. no. 48, collected by Yaichiro Okada, May 15, 1929, many males and females, Coll. no. 80, collected by Eiji Uchida, Aug. 15, 1930, many males and females, Coll. no. 101, collected by Arimoto, Aug. 14, 1931, 2 males, attached to *Aglaophenia* (Hydrozoa), Coll. no. 44; Mera Bay, Shizuoka Pref., collected by Kenichi Ebina, Jul. 17, 1967, 6 males, Coll. no. 91; Off Toyoura, collected by Usu-branch of Hokkaido Central Fish. Exp. St., Sep. 15, 1968, 157 males, 179 females, Coll. no. 323; Off Kanida-cho, Aomori Pref., collected by Yuji Tominaga, Jun. 26, 1968, 2 males, attached to a scallop, Coll. no. 52, Apr. 9, 1968, 3 males, Coll. no. 186, May 7, 1968, many males and females, Coll. no. 227, Jun. 8, 1968, many males and females, taken from set nets, Coll. no. 302; Ajigasawa, Aomori Pref., collected by Kunio Takahashi, Mar. 25, 1968, 1 male, depth 15 meters, Coll. no. 168; Off Yokohama-cho, Aomori Pref., collected by Harutaka Ishioka, May 7, 1968, 1 male, Coll. no. 19; Hirota Bay, collected by Kikuchi, Iwate Fish. Exp. St., Apr. 4, 1968, 13 males, 3 females, attached to *Undaria*, Coll. no. 181; Noda Bay, Iwate Pref., collected by Yukichi Niinuma, Jun. 4, 1968, 4 males, 2 females, Coll. no. 276; Kesennuma Bay, collected by Kesennuma-branch of Miyagi Fish. Exp. St., Apr. 20, 1968, attached to *Undaria*, Coll. no. 210; Matsushima Bay, collected by Hideo Ohhara, Jun. 19, 1968, many males and females, Coll. nos. 360 and 361; Onahama, Fukushima Pref., collected by Saburo Suzuki, May 27, 1968, many males and females, Coll. no. 262, collected by Hiroji Ishikawa, Sep. 8, 1968, 3 males, 1 female, attached to set nets, depth 27

meters, Coll. no. 318; Toyoma, Fukushima Pref., collected by Tenjin and Arimoto, Aug. 9, 1968, many males and females, Coll. no. 320; Ohshima, Tokyo, collected by Ryuzo Kurata, Jun. 8, 1968, 14 males, 6 females, Coll. no. 280; Off Odawara, collected by Isao Shibata, 13 males, 3 females, attached to set nets, Coll. no. 187, Apr. 10, 1968, 4 males, Coll. no. 189, 4 males, Coll. no. 189; Noh-machi, Niigata Pref., collected by Rokuro Mizusawa, Jul. 19, 1968, 13 males, 8 females, Coll. no. 319; Ryozu Bay, collected by Toshihiko Tone, Mar. 21, 1968, 6 males, 12 females, attached to set nets, Coll. no. 126; Itoigawa, Niigata Pref., collected by Shizuo Shoyama, Apr. 16, 1968, 1 male, 1 female, attached to rope for farming *Undaria*, Coll. no. 204; Aise, Ibaragi Pref., collected by Kumeju Kikuchi, Jul. 21, 1968, 1 female, attached to set nets, Coll. no. 285; Udezu, Ishikawa Pref., collected by Shigeru Machinaka, Mar. 14, 1968, 10 males, attached to set nets, Coll. no. 118, 13 males, 1 female, Coll. no. 120; Amehare-Kaigan, Toyama Bay, collected by Makoto Shibuya, May 10, 1968, 9 males, 1 female, Coll. no. 235; Uchiura Bay, Fukui Pref., collected by Tohru Yasuda, Feb. 28, 1968, 3 males, 1 female, Coll. no. 175, 5 males, 4 females, Coll. no. 174; Otomi, Fukui Pref., collected by Tohru Yasuda and Arimoto, Mar. 29, 1968, 4 males, 1 female, depth 5 meters, Coll. no. 190, 1 female, depth 2 meters, Coll. no. 194; Kawana, Shizuoka Pref., collected by Shuichiro Isokawa, May 22, 1968, attached to set nets, many males and females, Coll. no. 241, collected by Haruo Higaki, Jun. 1, 1968, many males and females, Coll. no. 243, collected by Shuichiro Isokawa, Jun. 20, 1968, 13 males, Coll. no. 351, 1 male, 15 females, Coll. no. 352, 23 males, 2 females, Coll. no. 353, 1 male, Coll. no. 354, 23 males, 9 females, Coll. no. 355, 20 males, 1 female, Coll. no. 356; Yazu Bay, Shizuoka Pref., collected by Fuji Fish. Union, May 30, 1968, 1 male, attached to set nets, Coll. no. 248, many males and females, Coll. no. 247, 1 male, Coll. no. 248, Jun. 7, 1968, many males and females, Coll. no. 277, many males and females, Coll. no. 278, Jun. 25, 1968, a good many males and females, Coll. no. 309; Arai Bay, Shizuoka Pref., collected by Arai Fish. Coop. Ass., May 22, 1968, many males and females, Coll. no. 264, a good many males and females, Coll. no. 265, Jun. 20, 1968, many males and females, Coll. no. 308, collected by Tsunetaro Kitajima, Jun. 20, 1968, 1 male, attached to set nets, Coll. no. 72; Off Ito-shi, collected by Ito-branch of Shizuoka Fish. Exp. St., Jun. 25, 1968, a good many males and females, Coll. no. 299, a good many males and females, Coll. no. 300; Ajiro Bay, Shizuoka Pref., collected by Ajiro Fish. Union, May 25, 1968, a good many males and females, attached to set nets, Coll. no. 307, collected by Tamotsu Bunma, Jun. 7, 1968, 18 males, attached to set nets, Coll. no. 305, a good many males and females, Coll. no. 306; Hokkawa, Shizuoka Pref., collected by Hokkawa Fish. Union, May 30, 1968, 24 males, 2 females, Coll. no. 261; Toyoura off Chita-shi, collected by Aichi Fish. Exp. St., Apr. 3, 1968, many males and females, Coll. no. 177, 2 males, Coll. no. 176; Shinojima, Aichi Pref., collected by Yaichiro Okada, Jul. 30, 1928, 2 males, 1 female, Coll. no. 82; Owase Bay, collected by Hagita, Owase Fish. Exp. St., Apr. 3, 1968, many males and females, Coll. no. 196; Ago Bay, Mie Pref., collected by Yutaka Yamamura, Jun. 4, 1968, 5 males, 2 females, Coll. no. 281, collected by

Shigehito Kojho, Feb. 4, 1968, 1 male, attached to pearl oyster, 1 male, Coll. no. 331; Off Iwami-cho, collected by Tottori Fish. Exp. St., May 8, 1968, 5 males, 2 females, Coll. no. 294; Ushimado, collected by Okayama Fish. Exp. St., Apr. 26, 1968, many males and females, Coll. no. 213; Off Mukaihigashi-cho, collected by Onomichi Agriculture and Forestry Office, May 6, 1968, many males and females, attached to *Undaria*, Coll. no. 228; Nomi-cho, Hiroshima Pref., collected by Hisaji Kubota, May 4, 1968, many males and females, Coll. no. 215; Numakuma-cho, Hiroshima Pref., collected by Hamai and Yokojima, May 15, 1968, 31 males, 11 females, attached to *Undaria*, Coll. no. 244; Shodoshima, Seto Inland Sea, collected by Tadashi Koba, Feb. 14, 1968, many males and females, attached to net for farming pearl oysters, Coll. no. 141; Nakajima, Ehime Pref., collected by Tadashi Koba, Feb. 14, 1968, 7 males, attached to pearl oyster nets, Coll. no. 150; Uwajima Bay, collected by Ehime Fish. Exp. St., Feb. 27, 1968, 1 male, 1 female, Coll. no. 160, 12 males, 4 females, Coll. no. 163, a good many males and females, attached to pearl oyster nets, Mar. 18, 1968, Coll. no. 158; Izari, Kii Sea, collected by Yasuhiko Jho, May 6, 1968, attached to rope for farming *Undaria*, Coll. no. 226; Off Naruto-shi, Tokushima Pref., collected by Tomoji Akizuki, Mar. 9, 1968, 1 male, 1 female, attached to *Undaria*, Coll. no. 153; Itojima Peninsula, collected by Fukuoka Fish. Exp. St., Apr. 15, 1968, many males and females, Coll. no. 287, 5 males, 2 females, Coll. no. 288; Shinjuhama, Saga Pref., collected by Atsushi Ichihara, May 28, 1968, 26 males, 3 females, Coll. no. 258; Amura, Kamijima, Amakusa, collected by Tadashi Koba, Feb. 14, 1968, 4 males, 2 females, Coll. no. 146; Off Kamae-cho, Ohita Pref., collected by Toshio Kodo, May 8, 1968, 2 males, Coll. no. 289; Off Yonhozu-mura, Ohita Pref., collected by Yonhozu Coop. Ass., May 14, 1968, 6 males, Coll. no. 291; Off Usuki, Ohita Pref., collected by Yoshiaki Torijima, Mar. 15, 1968, 1 male, attached to pearl oyster nets, Coll. no. 183; Aburatsu off Nichinan-shi, collected by Hirotaka Toshimi, Mar. 10, 1968, a good many males and females, Coll. no. 205, 2 males, Coll. no. 206; Kazama-ura, Aomori Pref., collected by Haruji Nakamura, 5 males, 4 females, attached to *Undaria*, Coll. no. 344, Apr. 17, 1969, 1 male, Coll. no. 359; Yotsukura, Fukushima Pref., collected by Yoh-ichi Yuzawa, Jun. 5, 1969, 5 males, 1 female, attached to *Sargassum*, Coll. no. 342; Noh-machi, Niigata Pref., collected by Rokuro Mizusawa, May 30, 1969, 4 males, 6 females, attached to *Undaria*, Coll. no. 345; Tassha Bay, Niigata Pref., collected by Takehiko Kitami, Jul. 12, 1969, Coll. no. 384, Front of Sado mar. biol. Lab. Niigata Univ., collected by Arimoto, May 4, 1970, 1 male, 5 females, attached to *Sargassum*, Coll. no. 387, 1 male, 2 females, Coll. no. 388, 5 males, 12 females, Coll. no. 389, 5 males, 12 females, Coll. no. 390, 13 males, Coll. no. 405, 9 males, 87 females, Coll. no. 417, collected by Kitami, Yamamoto and Arimoto, May 2, 1970, 400 males, 275 females, attached to *Sargassum*, Coll. no. 402, 1 meter depth, collected, by Kitami, Ishimi and Arimoto, May 2, 1970, 2 males, Coll. no. 403, 24 males, 12 females, Coll. no. 423, 63 males, 32 females, Coll. no. 424, 22 males, 6 females, Coll. no. 427, 24 males, 9 females, attached to rope for farming *Undaria*, Coll. no. 428, depth 5 meters, 6 males, 3 females, attached to *Undaria*, Coll. no. 433, 11 males, 4 females, attached to *Undaria*, Coll. no. 434,

5 males, 2 females, Coll. no. 439, 1 male, 1 female, attached to rope for farming *Undaria*, Coll. no. 445, 1 male, Coll. no. 448, 6 males, 1 female, Coll. no. 449, 1 female, Coll. no. 459, 2 males, Coll. no. 454, 3 males, 2 females, Coll. no. 458, 99 males, 68 females, Coll. no. 463, 73 males, 49 females, Coll. no. 464, 4 males, attached to rope for farming *Undaria* depth 10 meters, Coll. no. 492, 1 male, Coll. no. 493, 8 males, 4 females, attached to rope for farming *Undaria*, depth 18 meters, Coll. no. 397, 2 females, Coll. no. 398, 10 males, 9 females, Coll. no. 474; Senkaku Sankei, Sado Island, collected by Kitami, Ishimi and Arimoto, May 2, 1970, 7 females, attached to *Sargassum*, Coll. no. 482, 45 males, 98 females, Coll. no. 483; Senkaku Ikkei, Sado Island, collected by Kitami, Ishimi and Arimoto, May 2, 1970, 553 males, 475 females, attached to *Sargassum*, Coll. no. 497, 680 males, 673 females, Coll. no. 602; Himezu, Sado Island, collected by Kitami, Yamamoto and Arimoto, May 2, 1970, 1 male, attached to *Sargassum*, Coll. no. 625; Aikawa Bay, Sado Island, collected by Ishimi, Yamamoto and Arimoto, May 4, 1970, 3 males, 1 female, among benthos, Coll. no. 487; Off Futami, Sado Island, collected by Kitami, Ishimi and Arimoto, May 3, 1970, 5 males, 6 females, attached to *Sargassum*, Coll. no. 635; Obama, Sado Island, collected by Kitami, Yamamoto and Arimoto, May 4, 1970, 294 males, 307 females, Coll. no. 608, 9 males, 6 females, Coll. no. 611, 71 males, 73 females, Coll. no. 612; Kitaebisu, Sado Island, collected by Kitami, Ishimi and Arimoto, 335 males, 510 females, attached to *Sargassum*, Coll. no. 629; Toyoda, Sado Island, collected by Kitami, Ishimi, Yamamoto and Arimoto, 1 male, 3 females, attached to *Sargassum*, Coll. no. 619; Ohsu, Sado Island, collected by Kitami, Ishimi, Yamamoto and Arimoto, 1 female, attached to *Sargassum*, Coll. no. 623.

DESCRIPTION: Male: Body smooth except head, length of adult specimen 15 mm (Text-fig. 113, A); pereonite III longer than any other pereonite, II and IV subequal in length and a little shorter than III, V and VI subequal in length and taken together a little longer than IV, I a little shorter than VII; head with an anteriorly directed triangular projection; another individual with body length 15 mm (Text-fig. 113, B); body more stout and some degree of pleural development observed on pereonites III and IV. It appears that the larger the animal grows, the more robust the body and the more well-developed the pleural plate to ventro-lateral side of pereonites III and IV.

Antenna 1 a little shorter than half of the body length, its flagellum a little shorter than peduncle and 14-segmented; antenna 2 a little longer than peduncle of antenna 1, and with setae.

Gnathopod 2 attached rather to front part of pereonite II, basal segment short, propodus a little longer than pereonite II, and about twice as long as its greatest breadth, with projections, but without palmar spine, a distally oblong projection at distal angle of palm.

Gills circlar and large.

Pereopod 5 a little longer than pereonite V, 6 a little longer than 5, 7 a little longer than 6, whose segments are wide, and propodus has a pair of grasping spines.

Abdomen is typical of the genus.

An adult specimen with body length 15 mm (Text-fig. 113, B): Body stout; pereonite I shorter than any other pereonite, segments 1 and 2 of peduncle of antenna 1 stout; palm of propodus of gnathopod 2 with many spines.

A larval specimen with body length 1 mm (Text-fig. 113, C): Head smooth; pereonites 1-VII subequal in length; antenna 1 short, its flagellum 2-segmented; antenna 2 about as long as antenna 1; propodus of gnathopod 2 has a pair palmar spines.

Female: Body length of adult specimen 10.5 mm (Text-fig. 114, E), body smooth except head; pereonite III longer than any other pereonite, II and IV subequal in length and a little shorter than III, V a little shorter than IV, VI and VII taken together a little longer than V, I shortest of all pereonites; gnathopod 2 attached to fore end of pereonite II, propodus a little shorter than twice of its greatest breadth, palmar margin slightly convex, a palmar spine proximaly, setose and with a small poison tooth and small distal projection.

VARIATION: As fingured in Text-figs. 114, G-K: The peduncle of antenna 1 narrow in a specimen with body length 15 mm, while it is very plump in a specimen

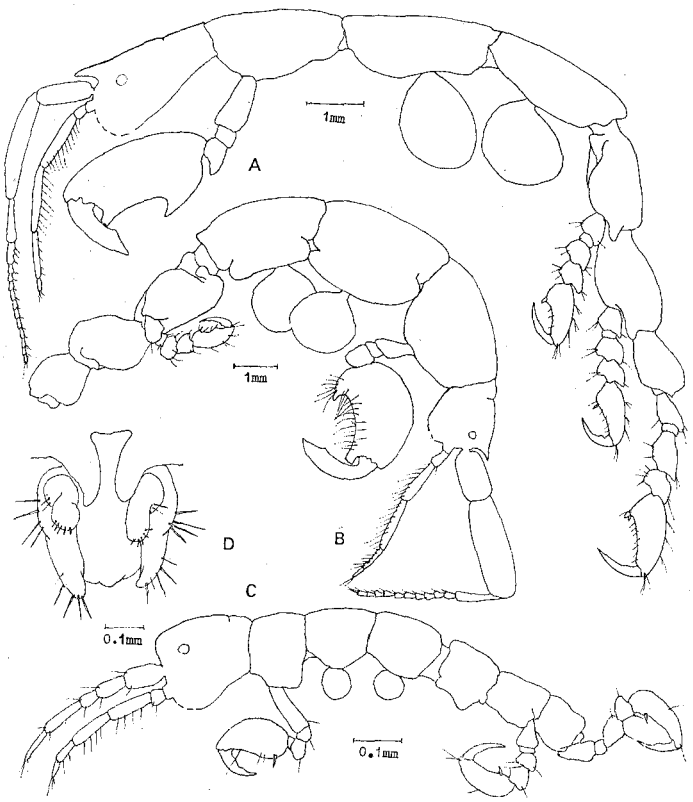

Fig. 113. *Caprella* (*Rostrhicephala*) *penantis* Leach.
A, adult male (material from Kawana, Shizuoka Pref., Coll. no. 354); B, adult male (material from ditto, Coll. no. 351); C, larva (material from ditto, Coll. no. 353); D, abdomen of male.

with body length 13.5 mm. Propodus of gnathopod 2 (Text-figs. 114, O-S), as the animal grows older, shows an individually different ontogenetic change, thus, in some adult males (Text-fig. 114, Q) poison tooth grows into a proximal projection and with many long spines at palmar margin, while other adult males (Text-fig. 114, R) show the poison tooth situated more to the center and have shedded the spines from palmar margin.

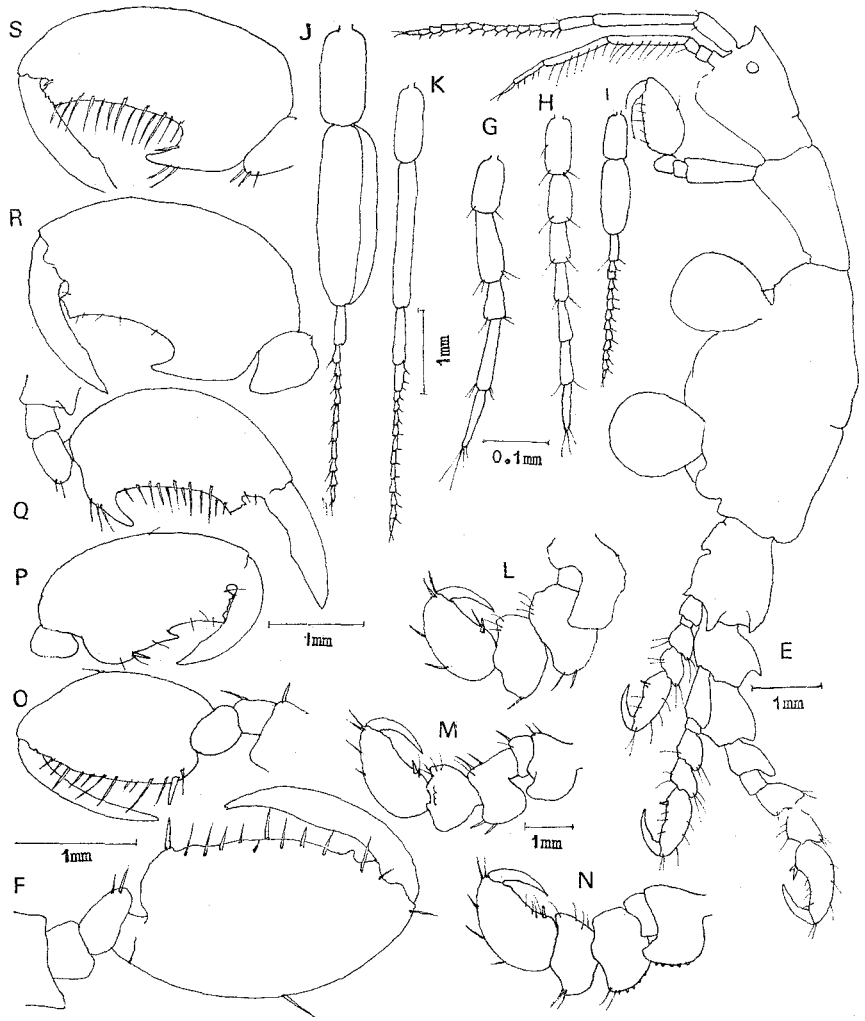

Fig. 114. *Caprella* (*Rostrhicephala*) *penantis* Leach.
E, adult female (material from Kawana, Shizuoka Pref., Coll. no. 355); F, propodus of gnathopod 2 of female; G, antenna 1 of 1 mm long male; H, antenna 1 of 1.5 mm long male; I, antenna 1 of 7 mm long male; J, antenna 1 of 13.5 mm long male; K, antenna 1 of 15 mm long male; L, pereopod 5 of adult male; M, pereopod 6 of adult male; N, pereopod 7 of adult male; O, propodus of gnathopod 2 of 4 mm body long male; P, propodus of gnathopod 2 of 6 mm body long male; Q, propodus of gnathopod 2 of 20 mm body long male; R, propodus of gnathopod 2 of 14 mm body long male; S, propodus of gnathopod 2 of 13.5 mm body long male.

DISTRIBUTION: Type locality: Devonshire Coast, England.

Other records: ?Bering Sea; Atlantic Coast of France, Spain and Portugal; British Isles; Azores; Mediterranean Sea; Atlantic Coast of North America from Nova Scotia and Gulf of St. Lawrence to Georgia; Fernandina Beach, Mayport, St. Augustine, Marineland, Ft. Pierce, Key West, Sarasota Bay, Tampa Bay, Dunedin, Panama City, Destin, Alligator Harbor, St. Georges Sound, and Apalachee Bay, Florida; Ocean Springs, Mississippi; Galveston, Freeport, Port Aransas, and Port Isabel, Texas; Cayenne, French Guiana; Safety Islands; Tristan da Cunha and Gouth Island; ?Falkland Islands; ?Chile; South Africa; California; Hawaii; Formosa Strait; Hong Kong; ?New Zealand; New South Wales, Australia.

Other localities around Japan: Enoura (Mayer, 1903: 80); Nagasaki (Mayer,

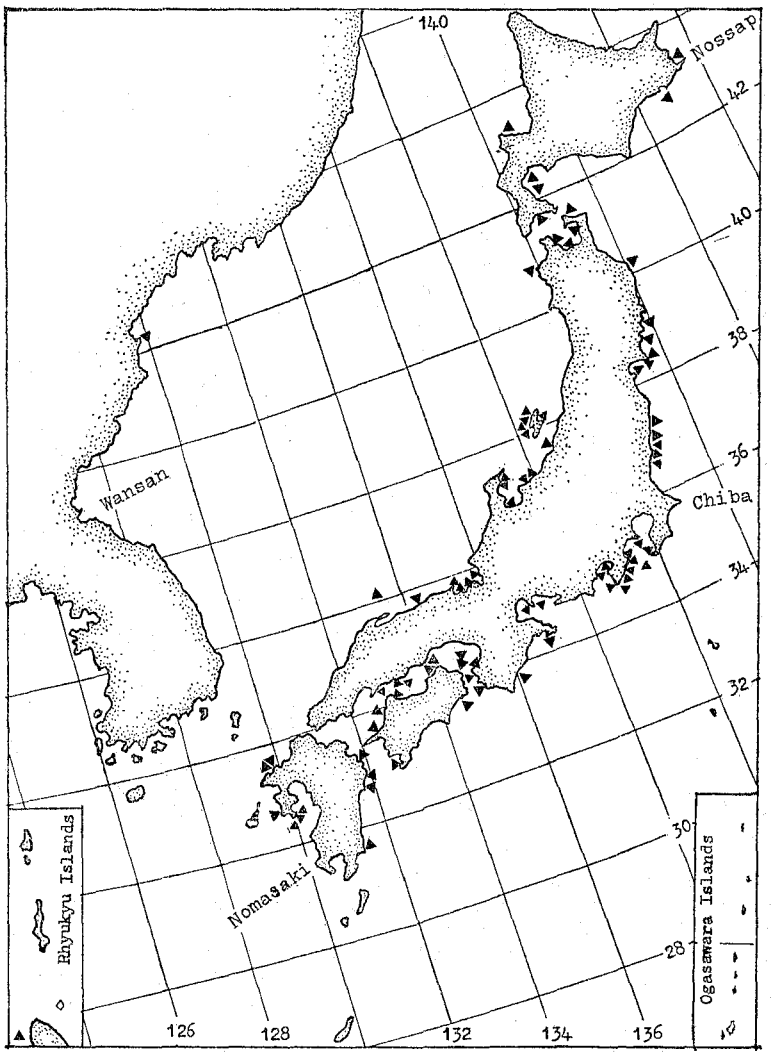

Fig. 115. Distribution records of *Caprella (Rostrhicephala) penantis* Leach around Japan.

1903: 80); Tateyama Bay (Arimoto, 1929: 16); Tanabe Bay (Utinomi, 1937: 312); Osyoro (Utinomi, 1943: 284); Asamushi (Utinomi, 1943: 282); Onagawa Bay, Miyagi Pref., (Utinomi, 1943: 273); Misaki (Utinomi, 1947: 72); Okinoshima, Fukuoka Pref. (Utinomi, 1947: 41); Tomioka, Kumamoto Pref. (Utinomi, 1947: 72); Formosa Strait (Utinomi, 1947: 72); Sagami Bay (Hirosaki, 1964: 68); Possjet Bay (Vassilenko, 1967: 200); Kamae Bay, Ohita Pref. (Utinomi, 1969: 302); Toyoura, Hokkaido (Arimoto, 1971: 14); Off Kanida-cho, Aomori Pref. (Arimoto, 1971: 19); Off Yokohama-cho, Aomori Pref. (Arimoto, 1971: 19); Hirota Bay, Iwate Pref. (Arimoto, 1971: 19); Noda Bay, Iwate Pref. (Arimoto, 1971: 20); Kesennuma Bay, Miyagi Pref. (Arimoto, 1971: 20); Matsushima Bay (Arimoto, 1971: 19); Off Iwaki-shi (Arimoto, 1971: 20); Obama, Fukushima Pref. (Arimoto, 1971: 20); Yotsukura, Fukushima Pref. (Arimoto, 1971: 19); Ohshima, Tokyo (Arimoto, 1971: 19); Off Odawara-shi (Arimoto, 1971: 19); Itoigawa, Niigata Pref. (Arimoto, 1971: 19); Ryozu Bay (Arimoto, 1971: 19); Off No-machi, Niigata Pref. (Arimoto, 1971: 20); Aise, Ibaragi Pref. (Arimoto, 1971: 20); Udezu, Noto, Ishikawa Pref. (Arimoto, 1971: 19); Tsuruga Bay (Arimoto, 1971: 19); Otomi, Fukui Pref. (Arimoto, 1971: 19); Uchiura, Fukui Pref. (Arimoto, 1971: 19); Sekumi, Fukui Pref. (Arimoto, 1971: 19); Ito Bay (Arimoto, 1971: 20); Off Kawana, Shizuoka Pref. (Arimoto, 1971: 20); Yazu Bay (Arimoto, 1971: 19); Hokkawa (Arimoto, 1971: 20); Arai (Arimoto, 1971: 19); Ajiro (Arimoto, 1971: 19); Toyoura, Chita, Aichi Pref. (Arimoto, 1971: 20); Shinojima, Aichi Pref. (Arimoto, 1971: 19); Owase Bay (Arimoto, 1971: 19); Ago Bay (Arimoto, 1971: 20); Awajishima (Arimoto, 1971: 19, 20); Iwami-cho, Tottori Pref. (Arimoto, 1971: 20); Ushimado (Arimoto, 1971: 19); Off Nomi-cho, Hiroshima Pref. (Arimoto, 1971: 20); Onomichi (Arimoto, 1971: 20); Numakuma, Hiroshima Pref. (Arimoto, 1971: 19); Shodoshima (Arimoto, 1971: 20); Nakajima, Ehime Pref. (Arimoto, 1971: 20); Uwajima Bay (Arimoto, 1971: 20); Off Naruto-shi (Arimoto, 1971: 20); Itoshima, Fukuoka Pref. (Arimoto, 1971: 19, 20); Karatsu Bay (Arimoto, 1971: 20); Off Usuki, Ohita Pref. (Arimoto, 1971: 19); Yonhozu, Ohita Pref. (Arimoto, 1971: 20); Off Nichinan-shi (Arimoto, 1971: 19); Off Aburatsu, Miyasaki Pref. (Arimoto, 1971: 20); Bentenjima, Nemuro (Utinomi, 1973: 34); Akkeshi Bay (Utinomi, 1973: 34); Samejima, Hayama (Utinomi, 1973: 34); Najima, Hayama, (Utinomi, 1973: 34); Osaka Bay (Utinomi, 1973: 34); Nagahama, Ehime Pref. (Utinomi, 1973: 34); Kurushima Strait, Ehime Pref. (Utinomi, 1973: 34); Kanmuri-jima, Wakasa Bay (Utinomi, 1973: 34); Tassha, Sado Island (Utinomi, 1973: 34).

Additional collection: Tateyama Bay (Yaichiro Okada, 1927, Coll. nos. 57, 58; Sadae Takahashi, 1928, Coll. no. 21; Arimoto, 1928, Coll. nos. 30, 44, 48, 53, 55–58; Yaichiro Okada, 1929, Coll. no. 80; Arimoto, 1929, Coll. no. 88; Eiji Uchida, 1930, Coll. no. 101; Arimoto, 1931, Coll. no. 44); Off Kanida-cho, Aomori Pref. (Yuji Tominaga, 1968, Coll. nos. 227, 302); Off Odawara (Isao Shibata, 1968, Coll. no. 187); Otomi, Fukui Pref. (Yasuda and Arimoto, 1968, Coll. nos. 272, 273, 642); Kawana, Shizuoka Pref. (Shuichiro Isokawa, 1969, Coll. nos. 351, 353–356); Kamae Bay, Ohita Pref. (Arimoto, 1971: 20); Amadaiba, Sagami Bay (Utinomi,

1973: 34).

New localities: Off Date-cho (Usu-branch of Hokkaido Fish. Exp. St., 1968, Coll. no. 332); Ajigasawa, Aomori Pref. (Kunio Takahashi, 1968, Coll. no. 168); Hanabuchi oil lamp Stand, Miyagi Pref. (Hideo O-hara, 1968, Coll. no. 361); Toyama Bay, Toyama Pref. (Tadashi Sibuya, 1968, Coll. no. 235); Uchiura, Fukui Pref. (Yasuda and Arimoto, 1968, Coll. no. 175); Kii Channel (Yasuhiko Jyo, 1968, Coll. no. 226); East of Amura, Kumamoto Pref. (Tadashi Koba, 1968, Coll. no. 146); Off Hakodate (Ryozo Yuki, 1969, Coll. no. 316); Kazamaura, Aomori Pref. (Shunichi Nakamura, 1969, Coll. nos. 344, 359); Tassha Bay, Sado Island (Kitami and Arimoto, 1970, Coll. nos. 388, 389, 390, 397, 403, 405, 423, 427, 433, 439, 448, 454, 458, 463, 474, 492); Himezu, Sado Island (Kitami and Arimoto, 1970, Coll. no. 625); Aikawa Bay (Kitami and Arimoto, 1970, Coll. no. 487); Senkaku Sankei, Sado Island (Kitami and Arimoto, 1970, Coll. no. 482); Off Futami, Sado Island (Kitami and Arimoto, 1970, Coll. no. 635); Obama, Sado Island (Kitami and Arimoto, 1970, Coll. no. 611); Senkaku Ikkei, Sado Island (Kitami and Arimoto, 1970, Coll. no. 602); Kitaebisu, Sado Island (Kitami and Arimoto, 1970, Coll. no. 629); Toyoda, Sado Island (Kitami and Arimoto, 1970, Coll. no. 619); Ohsu, Sado Island (Kitami and Arimoto, 1970, Coll. no. 623); Shiosaki, Kushimoto, Wakayama Pref., on *Acanthaster planci*, 1 male, Mar. 15, 1973, (K. Hayashi coll., Coll. nos. 650–651); Kodomari Bay, Fukui Pref., in plankton, 2 meters depth, 1 male, Nov. 15, 1943, (Tohru Yasuda coll., Coll. no. 655 (2)) Otomi, Fukui Pref., on rope 3 meters depth, 85 males and 32 females, Jun. 27, 1969, (T. Yasuda coll., Coll. no. 658 (1)); Futtsu-shi, Sagami Bay, 5 males and 2 females, May 27, 1973, (Toshiatsu Shimizu coll., Coll. no. 659); Shiraki, Fukui Pref., in the stomach of *Trachurus japonicus*, 1 male and 3 females, (T. Yasuda coll., Coll. no. 660 (1)).

REMARKS: This species seems to be the most common caprellid in Japan, and it has been given various names, thus in Mayer's last two monographs (1890, 1903) he names 20 varieties or forms of *Caprella acutifrons* group. McCain (1968, 1970) assigned several of them to *Caprella penantis*, as cited above, for the reason that the shape of gnathopod 2 and general body form were quite similar to those of the latter species.

68. *Caprella affinis* Brandt, 1851

Caprella affinis Brandt, 1851, in Middendorf, Reise Nord. Ost. Sibiriens, 2 (Zool. 1): 144.——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 70. ——Utinomi, 1947, Seibutsu (suppl.), 1: 72.

DISTRIBUTION: Type Locality: Sea of Okhotsk.

REMARKS: This species can not be determined exactly due to the imperfect original description (after Utinomi, 1947: 72).

69. *Caprella luctator* Stimpson, 1855

Caprella luctator Stimpson, 1855, Proc. Acad. nat. Sci. Philadlphia, 7: 383–384. ——Bate, 1862,

Catal. Amphip. Crust. British Mus.: 365. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 70. ——Mayer, 1890, Fauna Flora Golf. Neapel, 17: 74. ——Utinomi, 1947, Seibutsu (suppl.), 1: 74.

DISTRIBUTION. Type locality: Japan.
REMARKS: Species unrecognizable.

70. *Caprella nichtensis* Brandt, 1851

Caprella nichtensis Brandt, 1851, in Middendorf, Res. aus. Nord. u. Ost. Sibiriens 2 (Zool.), (1): 144. ——Mayer, 1882, Fauna Flora Golf. Neapel, 6: 70. ——Utinomi, 1947, Seibutsu (suppl.), 1: 75.

DISTRIBUTION: Type locality: Okhotsk Sea.
REMARKS: Species unrecognizable.

LITERATURE

Arimoto, Ishitaro, 1929. Studies on the Caprellidae from Tateyama, 1. Hakubutsu-gakkaishi (=Journ. Tokyo Nat. Hist. Soc.), 27 (38): 115–123, pl. 1. (In Japanese).

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